EXHIBIT A

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

COBBLESTONE WIRELESS, LLC, *Plaintiff*, v. T-MOBILE USA, INC. *Defendant*, NOKIA OF AMERICA CORPORATION, ERICSSON INC. *Intervenors*.	§	CASE NO. 2:22-cv-00477-JRG-RSP (Lead Case) JURY TRIAL DEMANDED
COBBLESTONE WIRELESS, LLC, *Plaintiff*, v. AT&T SERVICES INC.; AT&T MOBILITY LLC; AT&T CORP., *Defendants*, NOKIA OF AMERICA CORPORATION, ERICSSON INC. *Intervenors*.	§	CASE NO. 2:22-cv-00474-JRG-RSP (Member Case) JURY TRIAL DEMANDED
COBBLESTONE WIRELESS, LLC, *Plaintiff*, v. CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS, *Defendant*, NOKIA OF AMERICA CORPORATION, ERICSSON INC. *Intervenors*.	§	CASE NO. 2:22-cv-00478-JRG-RSP (Member Case) JURY TRIAL DEMANDED

DECLARATION OF JAMES A. PROCTOR

Pursuant to 28 U.S.C. § 1746, I, James A. Proctor, declare as follows:

1. I have been asked to provide an opinion concerning certain language that appears in U.S. Patent Nos. 8,891,347 ("the 347 Patent"), 9,094,888 ("the 888 Patent") and 10,368,361 ("the 361 Patent") (collectively, the "Asserted Patents"), and to rebut, if necessary, any statements or opinions by Plaintiff's expert with which I disagree. I have reviewed the Asserted Patents, as well as their respective prosecution histories. I have also reviewed extrinsic evidence regarding the patents, including extrinsic evidence which I understand Plaintiff has alleged is relevant to the construction of certain terms. If called upon, I would be willing to testify as set forth in this Declaration.

I. PROFESSIONAL BACKGROUND

2. My background and expertise that qualify me as an expert are described in detail in my *Curriculum Vitae* attached as **Attachment A**, which further includes an accurate list of all publications authored by me in the previous 10 years and a list of all cases in which I testified as an expert at trial or by deposition during the previous 4 years. Below I have summarized those qualifications, as well as any other background and expertise relevant to the technical issues in this case:

3. My educational background includes a Bachelor of Science in Electrical Engineering (BSEE) from the University of Florida in 1991 and Master of Science in Electrical Engineering (MSEE) from the Georgia Institute of Technology ("Georgia Tech") in 1992 focusing on digital signal processing.

4. I have worked as an engineer and entrepreneur in the field of wireless communications for over 25 years and have been involved with various aspects of wireless communications for the duration of my career.

5. From 1986 to 1991, while at the University of Florida, I interned with Harris Corporation in various roles including mechanical design, software development, and digital design. From 1991 to 1992, while at Georgia Tech, I worked at the Georgia Tech Research Institute (GTRI) as a graduate research assistant, performing software development on classified government programs.

6. From 1993 to 1995, while working for Harris Corporation, I designed various cellular communication systems for voice, data, and tracking/location. Many of these systems I designed utilized advanced communications technologies, such as those utilized in the then-developing and future telecommunications (such as IS95, W-CDMA, and aspects of LTE).

7. From 1995 to 1998, I worked at Spectrian in advanced development and technical marketing. At Spectrian, I interfaced with Nortel's and Qualcomm's product management and performed advanced technology development and systems analysis. In this role, I designed IS-95 CDMA and GSM base station power amplifiers and control electronics, and received several patents associated with advanced linearization techniques for the reduction of transmitted distortion. I note that the peak to average ratio of various waveforms was of particular concern in the design of the power amplifiers and associated linearization techniques with the designs I was involved with during my work at Spectrian.

8. From 1998 to 2002, I served as the Director of Strategic and Technical Marketing at Tantivy Communications, a venture capital-funded 3G cellular data and chip set company. At Tantivy, I helped to architect and standardize the I-CDMA Spread Spectrum Systems Air Interface Standard (T1P1.4). I also developed both wireless access terminals and base stations that complied with the standard. The base stations utilized various IP protocols, and interfaced with the wire line network utilizing IP over Ethernet. Additionally, I participated in and provided technical

contributions to 3GPP/3GPP2 standardization efforts related to the development of CDMA2000 and 1xEV-DO. This work resulted in me being a named inventor on more than 150 pending or issued U.S. patents or applications.

9. From 2002 to 2007, as co-founder of WiDeFi, Inc., I served in various roles including President, CEO, CTO, and board member. As the CEO, my responsibilities included advanced development of platform technologies. I was a named inventor of wireless technology components, including a frequency translating TDD repeater, a same frequency repeater architecture for TDD/FDD- based systems, and physical layer multi-stream MIMO repeater technology. WiDeFi invented and pro-vided wireless home networking products based on WiFi and cellular technologies. While at WiDeFi, I was a named inventor on over 25 issued U.S. patents or patent applications.

10. From 2007 to 2009, I consulted as a principal engineer for Qualcomm Inc. as part of the acquisition of WiDeFi's technology. While at Qualcomm, I worked with its corporate R&D division and developed consumer 3G and 4G cellular coverage enhancement systems utilizing WiDeFi's baseband interference cancellation technologies. My responsibilities included working with international cellular operators on product requirements, detailed W-CDMA simulations, Long Term Evolution ("LTE") systems analysis, and participation in prototype product realization. I am currently a named inventor on roughly 45 issued U.S. patents or patent applications assigned to Qualcomm.

11. From 2010 to the present, I have served as managing director and co- founder of Proxicom Wireless, LLC, which has developed and continues to develop cloud-based, mobile social networking and mobile payments technology based upon the proximity and location of mobile devices. Proxicom currently holds twelve issued U.S. patents and multiple pending patent

applications, of which I am a named inventor. Significant aspects of Proxicom's technology involve a mobile device's use of short range wireless technologies (802.11, near field communications, Bluetooth) in combination with cellular data links (3G/WCDMA or 4G/LTE, for example) to facilitate frictionless interactions via a wireless networked central cloud server.

12. Since 2007, I have also been the principal of Proctor Consulting, LLC. In this role, I have been a consultant relating to wired, wireless, and cellular communication and technologies, start-up companies and intellectual property. I have also been involved with numerous patent infringement, patent validity, and patent analysis assignments for public and private companies in the wired, wireless, and cellular networking industries.

13. Additionally, I have worked and consulted for both cellular infrastructure and device focused companies (Spectrian, Qualcomm, Fastback Networks), and defense contractors (Harris Corporation), where I developed covert- tracking and location technologies involving CDMA and smart-antenna technologies.

14. In various of the above-detailed roles, I have been responsible for the development of business plans, product development plans, product development budgets, and product bill of materials estimations. I have been responsible for numerous product development teams, including schedule and costs of the development process at various stages of my career. For example, at Tantivy Communications, I ran a joint development of I-CDMA cellular base stations in Seoul, Korea that were used in a field trial in that country. Additionally, as founder and CEO of WiDeFi, Inc., I was responsible for similar such activities, as required to raise venture capital funding and reporting to the board of directors.

15. I am currently a named inventor on more than 325 issued U.S. patents, and more than 700 international patent publications in total. A substantial portion of my work has focused on

wireless communication systems and products. A number of these patents and patent applications are related to the subject matter of the patents asserted in this matter. For example, the following patents, for which I am a named inventor, are examples of some of my experience relevant to the subject matter of this declaration:

U.S. Patent No.	Title	Priority Date
8,321,542	"Wireless channel allocation in a base station processor"	May 5, 2000
7,002,902	"Method and system for economical beam forming in a radio communication system"	Feb. 23, 2000
6,400,317	"Method and apparatus for antenna control in a communications network"	Feb. 2, 2001
8,259,687	"Dynamic bandwidth allocation for multiple access communications using buffer urgency factor"	June 31, 2001
11,443,344	"Efficient and secure communication using wireless service identifiers"	Sept. 8, 2008
8,477,665	"Method in a wireless repeater employing an antenna array for interference reduction"	July, 14, 2010
9,135,612	"Proximity detection, virtual detection, or location based triggering of the exchange of value and information"	Apr. 17, 2011
8,502,733	"Transmit co-channel spectrum sharing"	Feb. 10, 2012
8,422,540	"Intelligent backhaul radio with zero division duplexing"	Sept. 10, 2012

16. I am currently consulting, working with and/or advising a number of companies and universities. For example, I currently serve on the external advisory board to the University of Florida's Electrical and Computer Engineering department. I also perform expert consulting work, research, and development in the area of wireless communications with Proctor Consulting and Proxicom wireless. Finally, I perform conceptual and product development in the medical device field with Genesis Medical Devices.

17. Based on my professional experience, I believe I am qualified to testify as an expert on matters related to the patent at issue.

II. PERSON OF ORDINARY SKILL IN THE ART

18. All of the opinions I express in this Declaration regarding the Asserted Patents have been made from the standpoint of a person of ordinary skill in the field of the Asserted Patents at the time of the purported inventions.

19. Based on the materials and information I have reviewed and based on my experience in the technical areas relevant to each of the Asserted Patents, a person of ordinary skill in the art at the time of the alleged invention of each of the Asserted Patents[1] would have had had at least a bachelor's degree in electrical engineering, computer engineering, computer science, physics, or the equivalent, and at least two years of experience working in the field. Relevant working experience would include experience with cellular telecommunications and networking, radio-access networking architectures, protocols, and signal propagation in wireless networks. More education can supplement practical experience and vice versa. Based on my knowledge and experience, including as discussed above in Section I, I was a person of ordinary skill in the art at the time of the alleged invention of each Asserted Patent, which ranges from 2011 to 2014, and can provide opinions regarding the knowledge of a person of ordinary skill in the art as of that time. My opinions herein are, where appropriate, based on my understanding as to a person of ordinary skill in the art at that time. I myself had these capabilities at the time of the alleged inventions of the Asserted Patents between 2011 and 2014.

[1] I understand that Plaintiff alleges the following earliest possible priority dates for each Asserted Patent, which I use for my analysis herein:
(1) July 28, 2011 is alleged by Plaintiff to be the earliest possible priority date of the 347 Patent.
(2) April 29, 2011 is alleged by Plaintiff to be the earliest possible priority date of the 888 Patent.
(3) August 1, 2014 is alleged by Plaintiff to be the earliest possible priority date of the 361 Patent.

III. CLAIM CONSTRUCTION

A. The 347 Patent

i. "the channel estimation that includes the path parameter information" (Claims 1, 8, 15)

Claim Term	Defendants' Construction	Cobblestone's Construction
"the channel estimation that includes the path parameter information" Claims 1, 8, 15	Plain and ordinary meaning	No construction necessary; plain and ordinary meaning; not indefinite under 35 U.S.C. § 112.

20. I understand the parties agree this term has its plain and ordinary meaning, but dispute whether "the result of the channel estimation" falls under the plain and ordinary meaning of the term "channel estimation."

21. The claims require "the channel estimation" be performed. In all but claim 15, it is an express requirement of the claim:

> **1.** A method for wireless communication in a system including a transmitter, a receiver, and a plurality of propagation paths formed between the transmitter and the receiver which are capable of carrying a signal transmitted by the transmitter to the receiver, the method comprising:
>
> transmitting a first signal from the transmitter to the receiver via a first propagation path of the plurality of propagation paths;
>
> receiving the first signal at the receiver;
>
> ***performing a channel estimation*** based on the first signal to obtain path parameter information of the first propagation path;
>
> sending the channel estimation that includes the path parameter information from the receiver to the transmitter via the first propagation path;
>
> predistorting a second signal at the transmitter in a time domain, a frequency domain, and a spatial domain, according to the channel estimation based on the first signal;
>
> transmitting the predistorted second signal from the transmitter to the receiver via the first propagation path; and
>
> receiving the predistorted second signal at the receiver.

8. A system for wireless communication comprising:

a receiver,

a transmitter; and

a plurality of propagation paths formed between the transmitter and the receiver which are capable of carrying a signal transmitted by the transmitter to the receiver,

wherein the receiver is configured to receive a first signal that is transmitted along a first propagation path of the plurality of propagation paths from the transmitter, ***perform a channel estimation*** based on the first signal to obtain path parameter information of the first propagation path, and send the channel estimation that includes the path parameter information to the transmitter via the first propagation path, and

wherein the transmitter is configured to predistort a second signal in a time domain, a frequency domain, and a spatial domain according to the channel estimation that is based on the first signal and received from the receiver and to transmit the predistorted second signal to the receiver via the first propagation path.

19. A wireless device for performing wireless communication with a base station with a transmitter via a plurality of propagation paths, the wireless device comprising:

a receiver,

a computing device; and

a computer-readable storage medium having computer executable instructions stored thereon that are executable by the computing device to perform operations comprising:

receiving a first signal at the receiver via a first propagation path of the plurality of propagation paths;

performing a channel estimation based on the first signal to obtain path parameter information of the first propagation path;

sending the channel estimation that includes the path parameter information to the transmitter, and receiving a second signal via the first propagation path, the second signal predistorted in a time domain, a frequency domain, and a spatial domain according to the channel estimation based on the first signal.

22. The specification likewise repeats that the channel estimation be performed because it is a "method," "algorithm" or a "technique" or the like.

- "*Performing* a channel estimation." 347 Patent at Fig. 1.
- "a channel estimation of a first signal is *performed*." *Id.* at 8:5.

- "channel estimation *algorithm* is performed." *Id.* at 8:12.
- "Various channel estimations may be used, including the SAGE *algorithm*. Other *algorithms* for estimating the parameters include Maximum likelihood estimation *algorithms* including the specular-path-based maximum likelihood *method*." *Id.* at 8:17-21.
- "Other examples of *channel estimations which may be used* include Spectral-based *methods*, including the Bartlett beamformer, the Capon beam former, and the MUSIC (Multiple Signal Classification) *method*. These *methods* are used to compute the power spectrum of the channel in multiple dimensions, e.g. in the delay, Doppler frequency and directions. These *methods* can return estimates of the path parameters with low complexity. They are practical and much more appropriate for real implementation than the maximum-likelihood based estimation *methods*." *Id.* at 8:26-35.
- "Still another channel estimation *algorithm* which may be used in association with the non-spectral-based method are subspace-based *techniques*, such as the root-MUSIC *technique*, and the ESPRIT (Estimation of Signal Parameters based on Rotational-Invariance Technique) *algorithm*, as well as the extension of these algorithms, e.g. Propagator *method* and Unitary-ESPRIT technique. These *algorithms* have high accuracy, but because the input of these *algorithms* are the observations of channel from multiple independent snapshots in order to avoid the singularity issue of the covariance matrix of received signals, data must be collected from multiple frames in a relatively long time window." *Id.* at 8:36-47.

- "Approximation of the maximum-likelihood *method* based on iterative schemes may also be used at step 410. These *algorithms* include the expectation-maximization (EM) *method*, the space-alternating generalized Expectation-maximization (SAGE) *technique* and the so-called RiMAX (Richter's maximum likelihood estimation) *method*." *Id.* at 8:48-53.

23. A POSITA reading the claims of the and specification of the 347 Patent would understand that channel estimation is an algorithm or a method.

24. The next steps of the claim require sending the channel algorithm or method, as well as the result of the algorithm or method (the path parameter information) back to the base station.

- Claim 1: "sending ***the*** channel estimation that includes the path parameter information;"
- Claim 8: "send ***the*** channel estimation that includes the path parameter information;"
- Claim 15 (on the base station side): "receiving a channel estimation based on the first signal, ***the*** channel estimation including path parameter information;"
- Claim 19: "sending ***the*** channel estimation that includes the path parameter information."

25. I understand when a claim uses the word "the" as the antecedent basis, it is referring back to the previous use of the same term. In this instance, sending ***the*** channel estimation means sending the algorithm, method, or technique that was just performed back to the base station. Here, the claim language's use of "the" requires that no other interpretation (such as "the result of the channel estimation") can be used. Thus, the channel estimation itself must be sent back.

26. A POSITA would understand that one reason to send the algorithm to the base station is so the base station knows the algorithm used for the channel estimation, which might allow the base station to better understand how the path parameter information was calculated.

B. The 888 Patent

27. The 888 Patent is titled, "Wireless Handoff Between Wireless Networks" and discloses methods, apparatuses and systems to facilitate wireless device handoff between a first and second wireless network. 888 Patent at 3:27-30. Figure 1A below illustrates the concepts from the 888 Patent.

888 Patent at Fig. 1A (annotated).

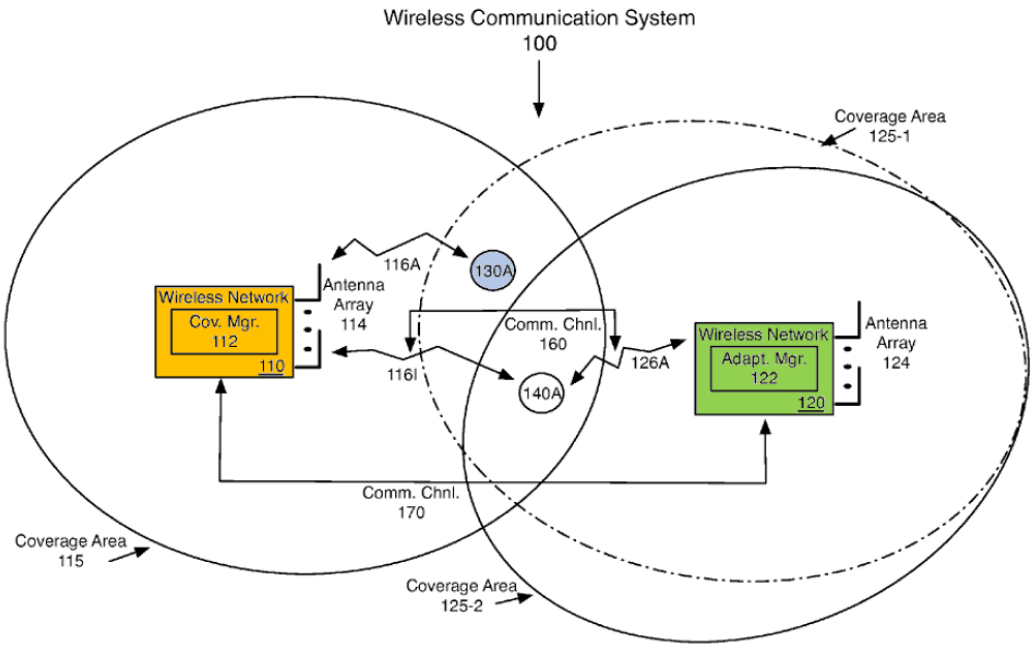


FIG. 1A

28. As shown above in orange and green respectively, there are two wireless networks (also referred to as base stations, *see* 888 Patent at 4:30-32) labeled 110 and 120, shown. The wireless devices (*e.g.*, UEs) labeled 130A (for example) are shown in blue.

29. The wireless device (UE) is connected to the source network and will be handed off to the target network. The claims label the source network as the "second wireless network" and the target network as the "first wireless network."

888 Patent at Fig. 1A (annotated).

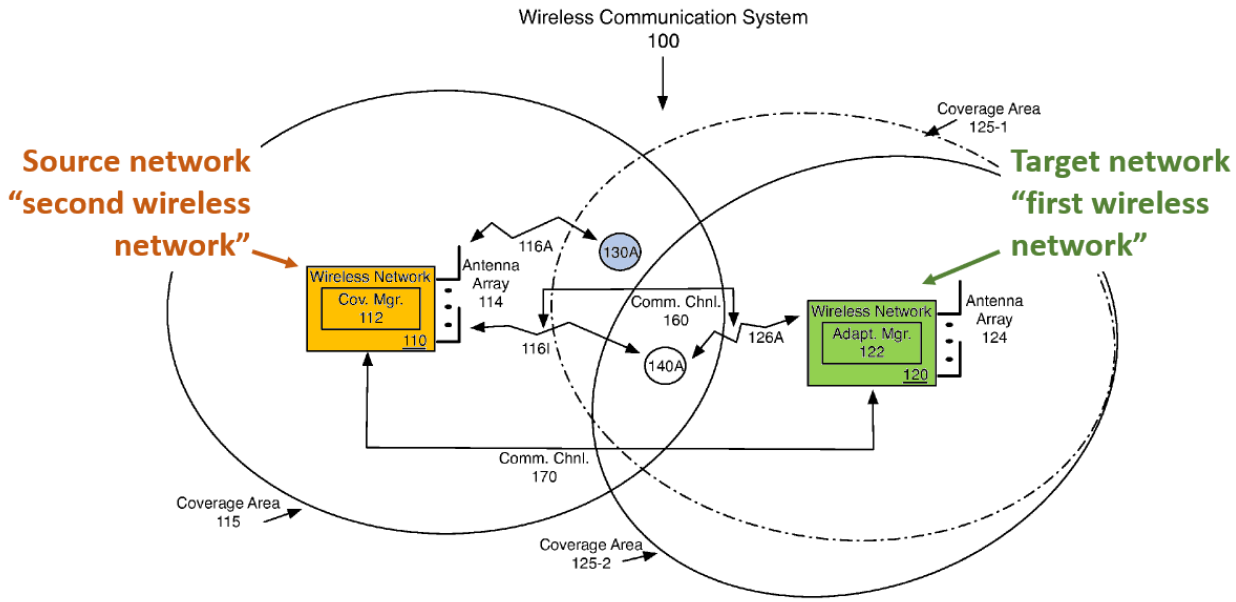


FIG. 1A

30. The wireless network 120 (in green) has two potential "coverage areas" 125-2 (shown by a solid line in the figure above) and 125-1 (shown by a dashed line in the figure above). These two coverage areas are illustrated below in cross stripes:

888 Patent at Fig. 1A (annotated).

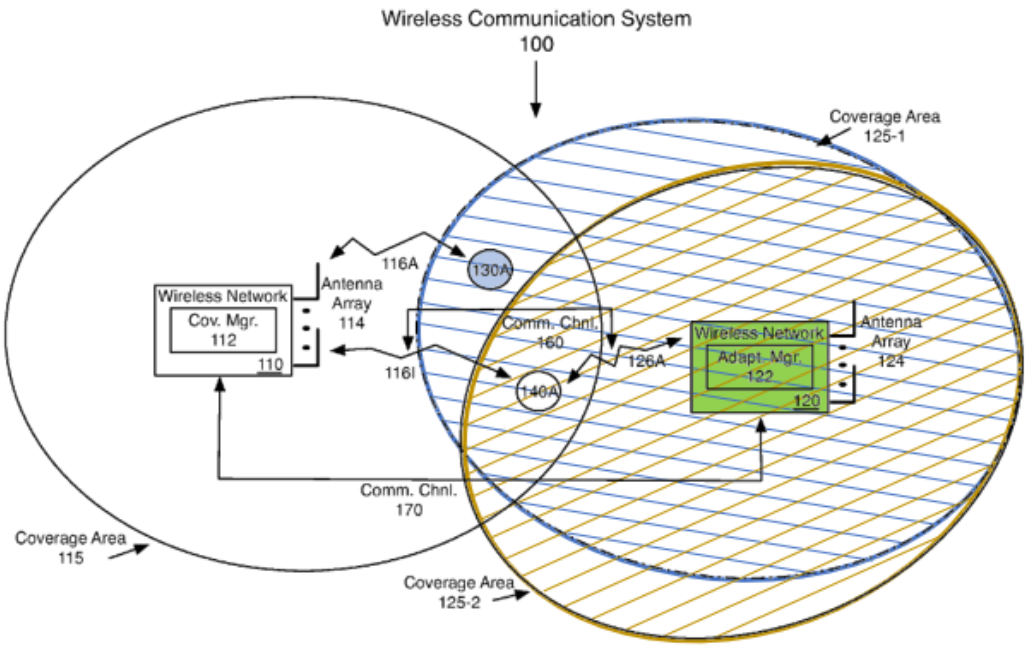


FIG. 1A

31. In Figure 1A, the target wireless network is operating with coverage area 125-2 (in orange). UE 130A (shown in blue) is not covered by coverage area 125-2 (in orange). 888 Patent at 5:35-38. To facilitate the handover, the 888 Patent describes that the target network must adapt its coverage area to 125-1 (in blue cross stripes) to cover the UE 130A. To adapt its coverage area, the 888 Patent describes adapting one or more beams of an antenna array to match coverage area 125-1.

32. To aid in this process, the 888 Patent then describes how network managers (*e.g.*, "coverage manager 112" and "adaption manager 122") negotiate and exchange information such as "coverage maps" so that "coverage manager 112 may be configured to determine that wireless device 130A . . . may be *capable* of being covered by wireless network 120 based at least on the coverage map." 888 Patent at 6:1-5 (emphasis added).

33. Based on the negotiation, the source wireless network 110 (the "second" wireless network of the claims) determines that the target wireless network 120 is capable of covering UE 130A and transmits a handoff request to wireless network 120 (the "first" wireless network of the claims). 888 Patent at 6:22-24. From there, "adaption manager 122 of wireless network 120" may "receive the handoff request and determine whether to adapt antenna array 124 to facilitate coverage of wireless device 130A." 888 Patent at 6:26-31.

i. "adaption manager" (Claim 20)

Claim Term	Defendants' Construction	Cobblestone's Construction
"adaption manager"" Claim 20	Indefinite under § 112, ¶6	No construction necessary; plain and ordinary meaning; not indefinite under 35 U.S.C. § 112; not subject to means-plus-function treatment under 35 U.S.C. § 112(f).

34. I understand that the parties dispute the meaning of "adaption manager," which appears in claim 20 of the 888 Patent.

35. I understand that the Plaintiff contends that this term should receive its plain and ordinary meaning, but "adaption manager" does not have a customary, or plain and ordinary, to one skilled in the art and the Plaintiff cites to no extrinsic evidence or support for any specific plain and ordinary construction.

36. I understand that the Defendants contend that this term should be found indefinite under § 112, ¶ 6, which I further understand to govern "means-plus-function" terms. I understand that a means-plus-function term requires that a corresponding structure be disclosed in the specification and also linked to the function, and that the corresponding structure be capable of performing the entirety of the function.

37. Having considered the parties' contentions, and based on my review of the claim language in the context of the specification and the prosecution history, it is my opinion that the

term is functional in nature and a POSITA would not have understood "adaption manager" to carry any meaning which connotates a structure, much less a sufficiently definite structure for performing the claimed receiving, causing, and transmitting functions.

a) The "adaption manager" term is a functional term.

38. Claim 20 of the 888 Patent, which contains the "adaption manager" term, is reproduced below.

> 20. A system for a wireless device handoff between a first wireless network and a second wireless network, the system comprising:
>
> an antenna array configured to generate one or more adaptable beams to modify a coverage area for the first wireless network; and
>
> ***an adaption manager having logic, the logic configured to****:*
>
> > receive a handoff request from the second wireless network, the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is capable of being covered by the first wireless network,
> >
> > cause a beam from among the one or more adaptable beams to be adapted in order to enable the wireless device to be covered by the first wireless network, and
> >
> > transmit a confirmation to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network.

39. The claimed "adaption manager" performs at least the three specific functions of (1) "receiv[ing] a handoff request from the second wireless network"; (2) "caus[ing] a beam . . . to be adapted in order to enable the wireless device to be covered by the first wireless network"; and (3) "transmit[ting] a confirmation to the second wireless network" indicating acceptance of the handoff request. 888 Patent, cl. 20. As the claim suggests, the "adaption manager" performs these three functions via programmed logic. *See* 888 Patent, 2:14-26.

40. I understand that the Plaintiff does not identify any extrinsic evidence in its P.R. 4-2 disclosures that define the term "adaption manager" in the art at the time of patenting. In light of

this, a POSITA would not have understood "adaption manager" to be anything more than an abstraction, or a "means," for performing its three claimed functions. "Adaption manager" is a generic placeholder that would retain the same meaning if it were replaced with other nonce words, like "means," "module," "device," etc. The "adaption" prefix fails to impart any structural significance to the term. The "manager" is a means for implementing what the patentee has defined as the "adaption" operation achieved through implementing the required receiving, causing, and transmitting functions.

41. Figure 3 of the 888 Patent depicts an exemplary "adaption manager" comprised of elements that are "configured to support or enable adaption manager 122" by carrying out logic or implementing an algorithm to perform the functions claimed in claim 20. Each of adaptation manager 122 and the adapt logic 310 are nothing more than a black box.

888 Patent at Fig. 3 (annotated).

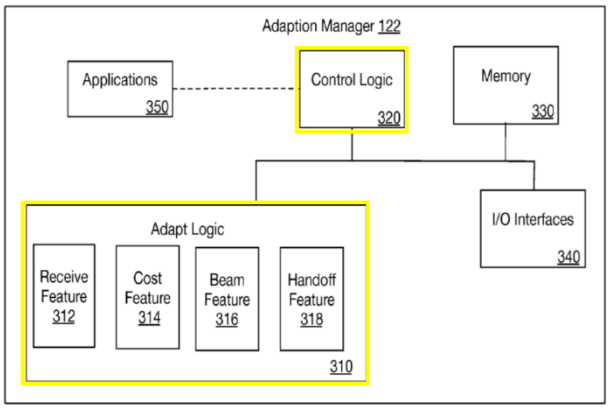


FIG. 3

42. For example, the "adaption manager 122 includes features and/or logic configured or arranged for a handoff of a wireless device between wireless networks (e.g., wireless networks 110 and 120)." 888 Patent, 9:1-5. The depicted "adapt logic 310 and control logic 320 may separately or collectively represent a wide variety of logic device(s) to implement the features of

adaption manager 122." 888 Patent, 9:20-23. The specification supports the functional nature of the "adaption manager," explaining that its internal "logic device(s)" perform various functions, such as: (i) implementing a wireless device handoff between wireless networks (*see* 888 Patent, 9:29-45; 12:23-36), receiving a handoff request (*see* 888 Patent, 12:37-41); (ii) determining whether to adapt the coverage area for a wireless network (*see* 888 Patent, 12:48-51); (iii) adapting one or more beams generated from or by an antenna array to facilitate coverage of a wireless device (*see* 888 Patent, 12:64-13:2); (iv) transmitting a confirmation to indicate acceptance of a handoff request from a wireless network for a wireless device (*see* 888 Patent, 13:9-13); (v) and/or handing off a wireless device from a wireless network (*see* 888 Patent, 13:19-22).

43. Thus, in my opinion "adaption manager" (or "an adaption manager having logic, the logic configured to") is functional in nature.

b) The "adaption manager" term is indefinite because the specification lacks adequate disclosure of the corresponding structure

44. The 888 Patent specification does not provide a structure corresponding to the "adaption manager" term, and a POSITA would not understand the term to have any sufficiently definite structure.

45. Although "adaption manager" is referenced throughout the 888 Patent's specification, the disclosures do not impart any structural significance to the term. The specification only describes "adaption manager" in functional terms, rather than particularly pointing out a particular structure associated with performing the associated functions. In particular, the "adaption manager" programmed to carry out the functions recited in the claims would need to be implemented in a special purpose computer, but all that is recited in the specification as "example logic device[s]" are "one or more of a computer, a microprocessor, a microcontroller, a field programmable gate array (FPGA), an application specific integrated circuit

(ASIC), a sequestered thread or a core of a multi-core/multi-threaded microprocessor or a combination thereof." 888 Patent at 9:23-28.

46. A POSITA would not find this to be sufficiently definite structure.

47. Moreover, some disclosures describe potential locations for the "adaption manager." *See* 888 Patent, 5:18-25 ("[A]daption manager 122 may be co-located with a base-station associated with wireless network 120. Also, in other examples, adaption manager 122 may be located with control elements that may remotely manage and/or control wireless network 120. For these other examples, adaption manager 122 may be located remote to antenna array 124, which provides coverage areas 125-1 and 125-2 for wireless network 120."). Describing the location of the adaption manager does not provide any sufficiently definite direction to a POSITA about the specially programmed computer.

48. Other disclosures use functional language to explain that the "adaption manager" performs functions, but the specification leaves entirely unanswered how it does so. *See* 888 Patent, 12:23-26 (explaining that the "adaption manager" can illustrate example "methods implemented at a wireless network (e.g., wireless network 120) for a wireless device handoff between another wireless network (e.g., wireless network 110) and the wireless network"); *see also* 888 Patent, 12:37-47 (explaining that "adaption manager 122 of wireless network 120 may include logic and/or features configured to receive a handoff request from wireless network 110 (e.g., via receive feature 312)"); *see also* 12:37-13:28 (similarly disclosing the function that the "adaptation manager" can perform); 8:65-10:14 (same). The disclosures regarding "adaption manager" in the 888 Patent are nothing more than a restatement of the function, as recited in the claim.

49. In sum, no algorithmic structure is set forth in the specification for implementing the operations of the claimed "adaption manager."

50. In sum, the 888 Patent does not provide any structure, logic, process, or algorithm that can be linked to and/or capable of performing the claimed receiving, causing, and transmitting functions. Based on the specification's lack of disclosure, a POSITA would not be able to recognize and implement any the structure for the "adaption manager."

51. Thus, it is my opinion that "adaption manager" would not be understood by a POSITA to have a sufficiently definite meaning as the name for structure, and the specification is provides no clarity on the algorithm for the logic of the "adaption manager."

ii. "predetermined network load" (Claim 12)

Claim Term	Defendants' Construction	Cobblestone's Construction
"predetermined network load" Claim 12	Indefinite	No construction necessary; plain and ordinary meaning; not indefinite under 35 U.S.C. § 112.

52. I understand that the parties dispute the construction of "predetermined network load," which appears in claim 12 of the 888 Patent.

53. I understand that the Plaintiff contends that this term should receive its plain and ordinary meaning but in the context of the 888 Patent a POSITA at the time of the 888 Patent would have no known or common understanding of a predetermined network load.

54. The term appears in claim 12 below:

> A method according to claim 9, wherein the adapting one or more beams comprises adapting one or more beams based, at least in part, on **one of a predetermined network load** placed on the first wireless network due to the handoff of the wireless device or an effect of adapting one or more beams on other wireless devices currently communicatively coupled to the first wireless network.

55. In the claims of the 888 Patent, the UE is handed off from a "second network" to a "first network." Therefore, in the claim the beams must be adapted based at least in part on one of a predetermined network load placed on the first wireless network due to the handoff.

56. A POSITA would not have understood how adapting the beam in a target network (the "first network") could be based on a "predetermined network load . . . due to the handoff of the wireless device." A POSITA would have understood that the term "predetermined" means the determination must be performed before the handover takes place. However, in the context of the claim, a POSITA would not understand how adapting the beam based on a predetermined network load due to the handoff could be determined before the handoff.

57. The specification states the system could include features "configured to predetermine criteria such as what network load would be placed on [target] wireless network 120 if wireless device 130A was handed off from wireless network 110." 888 Patent, 6:63-66. However, the claim does not mention predetermining criteria about network loads that would be placed on the target wireless network if the wireless device was handed off. Instead, the claim discusses adapting one or more beams based on one of a predetermined network load placed on the first wireless network due to the handoff. In other words, the beams are adapted based on a predetermined network load, which simply makes no sense in the context of the specification description.

58. Likewise, in a portion of the specification, the 888 Patent states "[m]emory 330 may also be arranged to temporarily maintain information associated with determining whether to accept a handoff request (e.g., predetermined network loads)." 888 Patent, 9:50-53. Again, this section talks about whether to accept a handoff request based on information such as predetermined network loads. This sheds no light on how the network would adapt a beam based a predetermined

network load after the handoff decision (in the independent part of the claim) has already taken place.

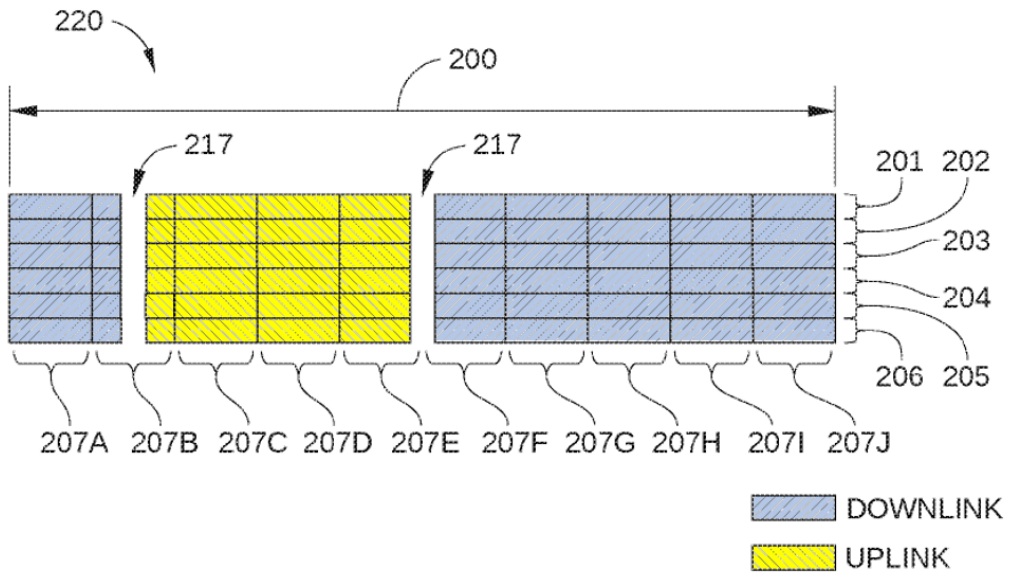
59. For these reasons, a POSITA would not understand "predetermined network load" in the context of the claim to have a plain and ordinary meaning and should be rendered indefinite.

C. The 361 Patent

60. The 361 Patent describes both FDD and TDD resource allocation schemes, though the claims are more relevant to TDD configurations as FDD systems typically are not reconfigured for the modification between uplink and downlink resources.

61. Figure 2B illustrates frequency spectrum resource allocation employing TDD. 361 Patent, 5:11-14.

361 Patent, Fig. 2B (annotated).



62. Like the figures addressed above, the blue resource blocks and subframes are allocated for downlink and the yellow ones for uplink.

63. The 361 patent states that is seeks to address a challenge of "efficient use of available wireless communication spectrum." 361 Patent, 1:19-24, 32-34. The 361 patent

acknowledges existing "communication schemes commonly used" "time-division duplex (TDD)" but this scheme "may typically be unable to employ all available frequency spectrum resources when uplink and downlink traffic is constantly changing." 361 Patent, 3:23-38.

64. The process to solve the purported identified problem is described in Figure 4:

361 Patent, FIG. 4 (annotated)

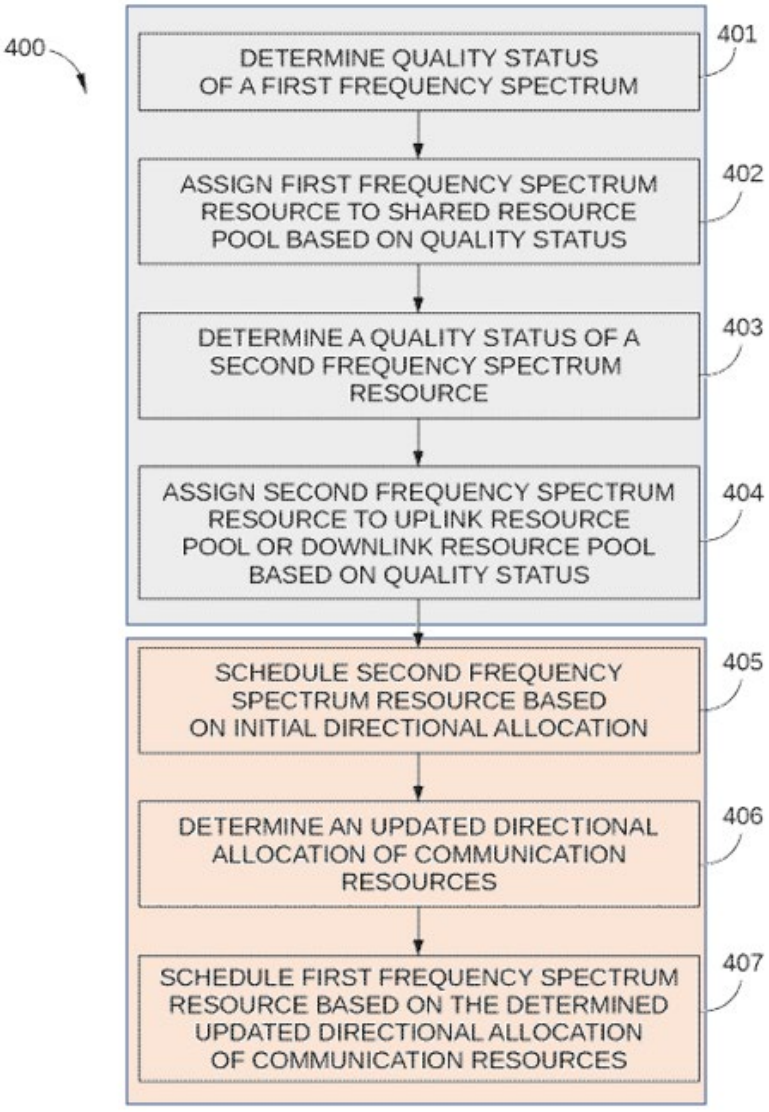


FIG. 4

65. The process occurs in two phases, which I have annotated in grey and orange.

66. In phase one (shaded in grey on top), the resources are measured and assigned based on their quality. In phase two (shaded on orange on bottom), the resources are scheduled based on "allocation determinations" (*e.g.*, traffic needs or interference measurements) in the network. 361 Patent, Fig. 4, 10:55-13:4.

67. Starting with phase one, in steps 401 & 403 shown in Figure 4, the method "obtain[s] the quality status of the current uplink and downlink frequency spectrum resources available (e.g., subcarriers 201-206) using quality status module 113." 361 Patent, 8:50-53. To obtain the quality of the signal, the 361 Patent states "that *determination of quality status*, as described above, can be performed *using information typically already measured by LTE and LTE-Advanced wireless communication systems*." 361 Patent, 8:53-64; 8:64-9:2. Two of the known measurement types already in use in LTE and LTE-A include measuring CQI on the downlink and RIP on the uplink. 361 Patent, 8:60-9:2; *see also id.,* 10:55-11:46.

68. Still in phase one, *in steps 402 and 404*, the method describes using "the quality status measured" to sort the resources into "pools." 361 Patent, 9:3-5 (emphasis added); *see also id*. 10:8-28. The first pool (identified in step 402) is labeled as the "shared resource pool." This pool is where the first frequency resource is assigned. 361 Patent, 11:28-32 (emphasis added). The 361 Patent describes how this shared pool is filled with resources that are measured to be "sub-optimal" for both downlink and uplink. 361 Patent, 11:28-32 (emphasis added). The second and third pools (identified in step 404) are labeled the (i) "downlink resource pool" and (ii) the "uplink resource pool." These pools are filled with resources that are measured to be most suitable for either the downlink (e.g., "high CQI") or uplink (e.g., "low RIP"), respectively. 361 Patent, 9:9-13, 11:4-38, 11:47-12:7.

69. In phase two *in step 405*, a scheduler schedules resources. The scheduler performs an "initial allocation" by scheduling the downlink resources from the downlink resource pool and the uplink resources from the uplink pool. 361 Patent, 9:30-40, 12:8-34.

70. *In step 406*, the scheduler performs an "updated directional allocation of frequency spectrum resources" based on the number of current resources requests, the current scheduling of uplink channels and downlink channels, and remaining resources not yet scheduled. 361 Patent, 9:47-63, 12:35-54.

71. *In step 407*, the resources are scheduled from the shared resource pool in either the uplink or downlink direction depending on what kind of resource is needed. 361 Patent, 12:55-62. "Consequently, frequency spectrum resources may be dynamically allocated to satisfy resource requests for node 110, so that very few or no frequency spectrum resources are idle." 361 Patent, 10:1-6, 12:55-13:4.

72. The 361 Patent also makes clear that "each individual [physical resource block] PRB" may constitute a frequency resource. 361 Patent, 10:29-38.

i. <u>"quality status module configured to determine a respective status of a first frequency spectrum resource and a second frequency spectrum resource" (Claim 10)</u>

Claim Term	Defendants' Construction	Cobblestone's Construction
"quality status module configured to determine a respective status of a first frequency spectrum resource and a second frequency spectrum resource" Claim 10	Means-plus-function term governed by § 112(f) **Function:** determine a respective quality status of a first frequency spectrum resource and a second frequency spectrum resource, wherein each of the first frequency spectrum resource and the second frequency spectrum resource are	No construction necessary; plain and ordinary meaning; not indefinite under 35 U.S.C. § 112; not subject to means-plus-function treatment under 35 U.S.C. § 112(f).

	associated with an air interface that is available for use by the wireless base station for an uplink channel or a downlink channel **Structure:** Processor with software running an algorithm to execute measurement of "channel quality indicator (CQI), received interference power (RIP), and/or any other suitable quality metric or key performance indicator, such as RSSI, acknowledgment/negative acknowledgement (ACK/NACK) frequency, dropping rate, block error rate, bit error rate, signal-to-interference-plus-noise ratio (SINR), etc." 4:29-34	

73. I understand that the parties dispute the meaning of quality status module configured to determine a respective status of a first frequency spectrum resource and a second frequency spectrum resource," which appears in claim 10 of the 361 Patent.

74. I understand that the Plaintiff contends that this term should receive its plain and ordinary meaning, but "quality status module configured to determine a respective status of a first frequency spectrum resource and a second frequency spectrum resource" does not have a customary, or plain and ordinary, to one skilled in the art and the Plaintiff cites to no extrinsic evidence or support for any plain and ordinary construction.

75. I understand that the Defendants contend that this term should be construed under § 112, ¶ 6, which I further understand to govern "means-plus-function" terms. I understand that a means-plus-function term requires that a corresponding structure be disclosed in the specification

and also linked to the function, and that the corresponding structure be capable of performing the entirety of the function.

76. Having considered the parties' contentions, and based on my review of the claim language in the context of the specification and the prosecution history, it is my opinion that the term is functional in nature and a POSITA would understand the term as Defendants have proposed to construe it.

a) The "quality status module" term is a functional term

77. Claim 10 of the 361 Patent, which contains the "quality status module configured to determine a respective status of a first frequency spectrum resource and a second frequency spectrum resource" term, is reproduced below. (emphasis added).

> 10. A wireless base station for a wireless communication network, the wireless base station comprising:
>
> ***a quality status module configured to determine a respective quality status of a first frequency spectrum resource and a second frequency spectrum resource***, wherein each of the first frequency spectrum resource and the second frequency spectrum resource are associated with an air interface that is available for use by the wireless base station for an uplink channel or a downlink channel;
>
> a processor coupled to the quality status module and configured to:
>
> > determine, based on the quality status of the first frequency spectrum resource, that the first frequency spectrum resource is a sub-optimal resource, for the uplink channel and the downlink channel, relative to other frequency spectrum resources that are available for use by the wireless base station; and
> >
> > in response to the determination that the first frequency spectrum resource is the sub-optimal resource, assign the first frequency spectrum resource to a shared resource pool; and
>
> a scheduler module coupled to the processor and configured to:
> > schedule the second frequency spectrum resource for the uplink channel or the downlink channel based on an initial directional allocation of frequency spectrum resources for the wireless base station;

> determine an updated directional allocation of frequency spectrum resources for the wireless base station after the second frequency spectrum resource is scheduled for the uplink channel or the downlink channel; and
>
> schedule the first frequency spectrum resource based on the updated directional allocation of frequency spectrum resources for the wireless base station.

78. I understand that the Plaintiff does not identify any extrinsic evidence in its P.R. 4-2 disclosures that define the term "a quality status module configured to determine a respective quality status of a first frequency spectrum resource and a second frequency spectrum resource" in the art at the time of patenting. "Module" is a generic description for software or hardware that operates as a "means" for performing the claimed determination function. In the context of the claim, "module" does not provide any indication of structure and sets forth a black box recitation of a structure for providing the claimed determination function as if the term "means" had been used. The prefix "quality status" does not impart any structure into the term "module." I have reviewed the specification and file history and nothing in the specification and prosecution history convey additional structure. For example, the "quality status module 113" is described as "suitably configured software, firmware, or logic circuit entity, etc." 361 Patent, 10:56-58.

79. Thus, in my opinion "quality status module configured to determine a respective status of a first frequency spectrum resource and a second frequency spectrum resource" is a purely functional term.

b) The "quality status module term" should be construed according to the clearly defined claim language and associated disclosures

80. A POSITA would understand that the function of the "quality status module" is to "determine a respective quality status of a first frequency spectrum resource and a second frequency spectrum resource, wherein each of the first frequency spectrum resource and the second frequency spectrum resource are associated with an air interface that is available for use by the

wireless base station for an uplink channel or a downlink channel," as the claim language expressly defines.

81. The specification supports this functional understanding. *See, e.g.,* 361 Patent 1:62-2:3 ("The quality status module is configured to determine a quality status of a first frequency spectrum resource associated with an air interface that is available for use by the wireless base station for an uplink channel or a downlink channel, and to determine a quality status of a second frequency spectrum resource associated with the air interface that is available for use by the wireless base station for an uplink channel or downlink channel."); 4:19-24 ("[A] quality status module 113 configured to ***determine a quality status*** of frequency spectrum resources associated with air interface 130 that are available for use by node 110 for an uplink or downlink channel."); 10:55-61 (same); 11:18-19 ("[T]he first frequency spectrum resource may be determined by quality status module 113 . . .").

82. A POSITA would look to the specification to obtain clarity and a more specific identification of the structure of the "module." Based on the specification, a POSITA would recognize that the structure is a processor with software running an algorithm to execute measurement of "channel quality indicator (CQI), received interference power (RIP), and/or any other suitable quality metric or key performance indicator, such as RSSI, acknowledgment/negative acknowledgement (ACK/NACK) frequency, dropping rate, block error rate, bit error rate, signal-to-interference-plus-noise ratio (SINR), etc." 361 Patent, 4:29-34. This algorithmic structure is expressly disclosed throughout the specification as the algorithm of the software of the "quality status module" for performing the claimed determination function. *See* 361 Patent, 8:53-60 ("[Q]uality status module 113 may acquire suitability of some or all of subcarriers 201-206 for uplink channels ***by measurement of RIP*** for each of subcarriers 201-206.

To acquire suitability of some or all of subcarriers 201-206 for downlink channels, node 110 ***may measure CQI***, for example ***through the measurement of reference signal received power (RSRP) and received signal strength indicator (RSSI)***."); 361 Patent, 9:3-5 ("[N]ode 110 may sort the available frequency spectrum resources ***based on the quality status measured for each***."); 361 Patent, 9:3-29 (explaining that the frequency spectrum resources are based on the measured quality status, providing examples that contextualize how the measured CQI and RPI values effect assigning the frequency spectrum resources into suitable resource pools); 361 Patent, 10:61-11:1 (same); 11:18-46 (same).

83. Thus, to better help the jury understand the specifically disclosed structure for performing the quality status determination function, this term should be construed as a means-plus-function term where the function is defined in the claim and the specific structure for implementing the necessary function is a processor with software running an algorithm to execute measurement of channel quality indicator (CQI), received interference power (RIP), and/or any other suitable quality metric or key performance indicator, such as RSSI, acknowledgment/negative acknowledgement (ACK/NACK) frequency, dropping rate, block error rate, bit error rate, signal-to-interference-plus-noise ratio (SINR), etc. 361 Patent, 4:29-34.

ii. <u>"shared resource pool" (Claims 10, 11, 17)</u>

Claim Term	Defendants' Construction	Cobblestone's Construction
"shared resource pool" Claims 10, 11, 17	A pool containing sub-optimal frequency spectrum resources that can be scheduled for uplink and downlink channels	No construction necessary; plain and ordinary meaning

84. I understand that the parties dispute the construction of "shared resource pool," which appears in claims 10, 11, and 17 of the 361 Patent. I understand that the Plaintiff contends

that this term should receive its plain and ordinary meaning. I understand that the Defendants contend that this term should be construed as "a pool containing sub-optimal frequency spectrum resources that can be scheduled for uplink and downlink channels." Having considered the parties' contentions, and based on my review of the patent claims, specification, and prosecution history, in my opinion a POSITA would understand the term as Defendants have proposed to construe it.

85. The specification of the 361 Patent repeatedly describes three pools: "a downlink resource pool , an uplink resource pool , or a shared resource pool." 361 Patent at Abs.; see also Fig. 1 ("downlink resource pool," "uplink resource pool," and "shared resource pool"); Fig. 4 ("shared resource pool," "uplink resource pool," and "downlink resource pool"); 4:14-16 ("[A] downlink resource pool 116, an uplink resource pool 117, and a shared resource pool 118."); 4:55-56 ("[A] downlink resource pool 116, an uplink resource pool 117, and a shared resource pool 118."); 10:35-37 ("[A] downlink resource pool 116, an uplink resource pool 117, and/or a shared resource pool 118.").

86. The 361 Patent repeatedly explains that resources are assigned to one of the three pools based on the determined quality status of the resource: "processor module 112 may assign high-quality resources to downlink resource pool 116 and/or to uplink resource pool 117, and may assign lower-quality frequency spectrum resources to shared resource pool 118." 361 Patent at 9:5-8. As other examples:

> For example, in some embodiments, subcarriers with high CQI, which may indicate that the subcarrier is well-suited for a downlink channel, may be assigned to downlink resource pool 116, and subcarriers with low RIP, which may indicate that the subcarrier is well-suited for an uplink channel, may be assigned to uplink resource pool 117.

361 Patent, 9:8-14.

> In block 404, ("Assign second frequency spectrum resource to uplink resource pool or downlink resource pool based on quality status"), processor module 112 (or any other suitably configured software,

> firmware, or logic circuit entity, etc.) may assign the second frequency spectrum resource to downlink resource pool 116 and/or to uplink resource pool 117 based on the quality status determined in block 403. For example, in response to the quality status of the second frequency spectrum resource being indicative that the second frequency spectrum is usable for an uplink channel, processor module 112 may assign the second frequency spectrum resource to uplink resource pool 117. In some embodiments, the second frequency spectrum resource may be "usable for an uplink channel" when the quality status meets or exceeds a particular threshold, such as when an RIP value associated with the second frequency spectrum resource is equal to or less than a specified maximum value or some other value. Similarly, in response to the quality status of the second frequency spectrum resource being indicative that the second frequency spectrum usable for a downlink channel, processor module 112 may assign the second frequency spectrum resource to downlink resource pool 116. In some embodiments, the second frequency spectrum resource may be "usable for a downlink channel" when the quality status meets or exceeds a particular threshold, such as when a CQI value associated with the second frequency spectrum resource is equal to or greater than a specified minimum value or some other value.

361 Patent, 11:47-12:7.

87. Thus, a POSITA would have recognized that "sub-optimal" resources—to the extent that term can be understood—are resources assigned to the shared resource pool.

88. Next, a POSTIA would have recognized that in all instances the resources placed into the shared resource pool can be scheduled for uplink and downlink channels based on the directional needs of the base station:

> scheduler module 114 (or any other suitably configured software, firmware, or logic circuit entity, etc.) may select the *first frequency spectrum resource from shared resource pool* 118 and may schedule the first spectrum *for either an uplink channel or a downlink channel*.

361 Patent, 12:57-61.

> a method for a base station of a wireless network to allocate communication resources between uplink and downlink channels comprises determining a quality status of a first frequency spectrum resource *that is available for use by the base station for an uplink or downlink channel; assigning the first frequency spectrum resource to*

> *a shared resource pool* based on the determined quality status of the first frequency spectrum resource;

361 Patent, 1:39-46.

> selecting the first frequency spectrum resource from the shared resource pool and scheduling the first frequency spectrum resource for either the uplink channel or the downlink channel

361 Patent, cl. 1.

> scheduler module 114 may schedule one or more frequency spectrum resources assigned to shared resource pool 118 *for uplink and/or downlink channels*.

361 Patent, 9:66-10:1.

> a particular frequency spectrum resource assigned to shared resource pool 118 may be scheduled by scheduler module 114 of node 110 *for an uplink or a downlink channel*

361 Patent, 10:8-11.

> For example, a frequency spectrum resource assigned to shared resource pool 118 may be scheduled by scheduler module 114 of node 110 for a downlink channel when the frequency spectrum resource has a higher CQI than other frequency spectrum resources assigned to shared resource pool 118. Similarly, a frequency spectrum resource assigned to shared resource pool 118 may be scheduled by scheduler module 114 of node 110 for an uplink channel when the frequency spectrum resource has a lower RIP than other frequency spectrum resources assigned to shared resource pool 118.

361 Patent, 10:13-23.

> Thus, because the first frequency spectrum resource is determined by quality status module 113 to currently be a sub-optimal resource for uplink and/or downlink channels, the first frequency spectrum resource may be assigned by processor module 112 to shared resource pool 118. The *first frequency spectrum resource may subsequently be scheduled by scheduler module 114 (see block 407) for an uplink or a downlink channel*

361 Patent, 11:28-35.

89. A POSITA reading the specification of the 361 Patent would understand the purpose of determining the quality status of the resource and sorting it into three pools is to improve "the

efficient use of available wireless communication spectrum." 361 Patent, 1:31-33. By allocating high quality resources to uplink or downlink in an "initial directional allocation" and then allocating the remaining resources to either an uplink or a downlink channel based on "updated directional needs," resources can be allocated on either the uplink or downlink channel depending on where the resource is needed.

90. However, uplink resource pool and downlink resource pool are not claimed terms. Instead, the only pool that is claimed is the shared pool. A POSITA would have recognized that "shared" is a relative term because there's no indication in the claim between "what" resource is shared. A POSITA would have recognized that, without context of the specification, a "shared" resource could be shared among items other than an uplink and downlink channel, which would defeat the entire purpose of the patent. 361 Patent, 9:66-10:1; 9:58-63 ("[T]he updated directional allocation of frequency spectrum resources may be based on the remaining resource requests (***for both uplink and downlink channels***) that are not yet satisfied after scheduling frequency spectrum resources assigned to downlink resource pool 116 ***and to*** uplink resource pool 117."). Thus, a shared resource pool should be construed as "a pool containing sub-optimal frequency spectrum resources that can be scheduled for uplink and downlink channels."

iii. <u>"sub-optimal resource" (Claims 10, 17)</u>

Claim Term	Defendants' Construction	Cobblestone's Construction
"sub-optimal resource" Claims 10, 17	Indefinite	No construction necessary; plain and ordinary meaning; not indefinite under 35 U.S.C. § 112.

91. I understand that the parties dispute the construction of "sub-optimal resource" which appears in claims 10 and 17 of the 361 Patent and require "determin[ing] based on the quality status of the first frequency spectrum resource, that the first frequency spectrum resource

is a ***sub-optimal resource***, for the uplink channel and the downlink channel, relative to other frequency spectrum resources that are available for use by the wireless base station." 361 Patent, claims 10, 17.

92. "Sub-optimal resource" is a term of degree. The patent specification and claims provide no guidance about the scope of the term, and the specification does not provide any express definition or objective boundary that would enable a POSITA to determine what falls within the scope of a "sub-optimal resource."

93. I understand that the Plaintiff contends that this term should receive its plain and ordinary meaning, but "sub-optimal resource" is not a term that would be readily understood by a POSITA and the Plaintiff offers no definition or evidence illustrating that what the plain meaning is.

94. The only disclosure of "sub-optimal resource" merely describes how "suitable" a resource is as compared to one or more other resources. First, the specification explains (referring to Figure 4) that in block 401 the "quality status module 113" determines "a quality status of a first frequency spectrum resource" by measuring the CQI value of the resource, the RPI value of the resource, or both. 361 Patent, 10:55-11:1. Subsequently, in block 402, the resource may be assigned to "shared resource pool 118, based on the quality status of the first frequency spectrum resource determined in block 401." 361 Patent, 11:4-10. The resource is assigned to "shared resource pool 118 when it is determined [to be] *less suitable for an uplink channel than one or more other frequency spectrum resources [] and also is less suitable for a downlink channel than one or more frequency spectrum resource* that are available to node 110" presumably making the resource "sub-optimal." 361 Patent, 11:10-17; *see also id*. at 11:28-33 ("[B]ecause the first frequency spectrum resource is determined by quality status module 113 to currently be a sub-

optimal resource for uplink and/or downlink channels, the first frequency spectrum resource may be assigned by processor module 112 to shared resource pool 118.").

95. Regarding "suitability," the written description explains that a resource is "*less suitable*" if its CQI and/or RIP is "*less than*" a CQI and/or RIP of "one or more other frequency spectrum resources." 361 Patent, 11:18-28. This description provides no objective basis or boundary to determine which resource is optimal versus which resource is suboptimal.

96. Alternatively, the 361 Patent suggests a resource could be optimal or suboptimal "when the quality status meets or exceeds a particular threshold, such as when an RIP value associated with the second frequency spectrum resource is equal to or less than a specified maximum value or some other value." 361 Patent at 11:58-64; 11:64-7 ("[W]hen the quality status meets or exceeds a particular threshold, such as when a CQI value associated with the second frequency spectrum resource is equal to or greater than a specified minimum value or some other value."). The patent, however, provides no objective basis or standard for this "maximum value or some other value" threshold. A POSITA reading this disclosure would likewise be unable to determine where an optimal resource stops and a sub-optimal resource begins.

97. Moreover, the 361 Patent does not even limit the quality measurement to CQI or RIP. The 361 Patent instead expands the manner in which quality can be measured to include other metrics in the network: "quality status module 113 may determine the quality status of each frequency spectrum resources associated with air interface 130 based on channel quality indicator (CQI), received interference power (RIP), ***and/or any other suitable quality metric or key performance indicator***, such as RSSI, acknowledgement/negative acknowledgement (ACK/NACK) frequency, dropping rate, block error rate, bit error rate, signal-to-interference-plus-noise ratio (SINR), ***etc.***" 361 Patent at 4:26-34. Although a POSITA reading this description would

recognize these metrics, in general, a POSITA would not be able to form an objective boundary as to what is "optimal" or what is "sub-optimal" because the 361 Patent does not provide any objective number or threshold to distinguish between those two concepts as it relates to any of these other metrics.

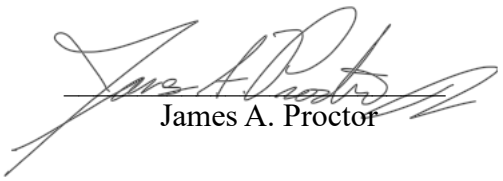
98. A POSITA would not be informed with reasonable certainty about the scope of "sub-optimal resource" for several additional reasons. For example, (1) it is not clear how much "less" a first CQI and/or RIP value must be in comparison to another resource's CQI and/or RIP (or any other metric disclosed in the 361 Patent specification) for the first resource to be "sub-optimal;" (2) it is not clear how many resources a first resource should be compared to determine whether it is a "sub-optimal resource" (*e.g.*, there's no disclosure of whether it suboptimal after one comparison, two comparisons, three comparisons, etc.); (3) it is not clear whether a first resource would be "sub-optimal" if, for instance, it has a higher CQI and a lower RIP than a second resource, or vice versa; and (4) it is not clear whether a first resource is "sub-optimal" in a use case where it has *lower* measurements than a second resource, but *higher* measurement than a third resource. In such a scenario, the resource would be considered both "optimal" and "sub-optimal" depending on what other resource its being compared to. The scope is made more unclear by the plain language, which states that a first resource can be assigned "shared resource pool 118" based on being "less suitable" for ***both*** a downlink and uplink channel, but then postures that it can be determined to be a "sub-optimal resource "for uplink ***and/or*** downlink channels." 361 Patent, 11:28-31.

99. "Sub-optimal resource" varies across changing circumstances and changes based on several other parameters. A POSITA would not be able readily ascertain the scope of the term,

particularly where the intrinsic record does not disclose objective boundaries for determining when a resource is "less suitable" or "sub-optimal" or any guidance regarding the same.

100. Thus, in my opinion, a POSITA would not be reasonably informed about the scope of "sub-optimal resource."

Executed this 12th day of March, 2024.



James A. Proctor

Attachment A

James A. Proctor Jr.
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EDUCATION

Georgia Institute of Technology, Atlanta, Georgia — M.S. Electrical Engineering
Graduated: September 1992
Interests: Digital Signal Processing, Communications, Optics

The University of Florida, Gainesville, Florida — B.S. Electrical Engineering
Graduated: May 1991
Minor Studies: Business
Honors & Activities: PI ETA SIGMA Honor Society
ALPHA LAMBDA DELTA Freshman Honor Society
ETA KAPPA NU National Electrical Engineering Fraternity

Skills & Achievements

- Successfully led Qualcomm / WiDeFi integration efforts resulting in a new product effort within Qualcomm related to the 3G/4G Market
- Co-founded WiDeFi and successfully raised >$14M of venture funding
- Generated intellectual property and product strategy leading to the acquisition of two companies (WiDeFi, and Tantivy Communications), contributing to > $100M of revenue
- Performed extensive customer and industry business development to provide support for innovative product definition, requirement definition, and customer support for business plan and forecasts (Qualcomm, WiDeFi, and Tantivy Communications)
- Led and coached many R&D teams to refine and de-risk innovative wireless concepts
- Led cross functional product teams to deliver high volume ready prototypes
- Ability to balance market, programmatic, and technical concerns and refine clear strategy and actionable plans
- Generated >320 issued US Patents Currently and >700 international patent publications
- Have spoken at numerous public events: industry, venture, and technical
- Strong communication and technical skills

Work Experience

Proctor Consulting, LLC — **December 2008 - Present**

- Early stage market and technology strategy
  - Interim CTO/Team Member, business development/validation
  - Roadmap / IP development
  - Advisory Board Member
- Technical / Market Consultant
  - Fastback Networks, Audigence, Peregrine Semiconductor
- Intellectual property portfolio analysis within the communications market space
  - Market / Product Applicability, Claims Chart Development and Analysis, Valuation
  - Expert Witness Consulting in Wireless Communications (WiFi, 2G-GSM, 3G-C2K/WCDMA, 4G/LTE and associated networks)

Proxicom Wireless. Co-Founder, Managing Director — **November 2011 – Present**

- Proximity based mobile technology utilizing a centralized trusted third party
- Development of foundational Intellectual Property (12+ US Patents)
- Enabling technology applicable to a variety of proximity based applications including highly secure: Mobile Payments, Electronic Coupons and Loyalty, Rating and Reviews, Social Commerce

Qualcomm Inc., Principal Engineer (Consulting) **October 2007 - October 2009**

- Technical and Business development leadership of a consumer level 3G wireless repeater product concept based upon WiDeFi's technology during the integration
- Provided technical leadership in architecture development
  - Defined initial architecture approach for the wireless repeater concept based upon WiDeFi's technology
  - Worked with technical team to refine approach and achieve "key proof points"
- Performed Business Development with International Wireless Operators
  - Worked closely with business development from ESG and QCT divisions
  - Developed bottoms up forecast with the top international wireless operators for consumer repeater products.
  - Refined product features to meet carrier's requirements
- Market Analysis to estimate Market Size and Competitive Landscape
- Named inventor on 44+ Issued or pending patents for Qualcomm on wireless repeater concepts

WiDeFi, Inc., EVP/CTO, and Co-Founder, Director **August 2005 - October 2007**

- Focused on aligning WiDeFi's technology and product roadmaps to customer and market drivers
  - Strategic and Technical Marketing, Product Definition
  - Market Analysis to estimate Market Size and Competitive Landscape
  - Collaborated with customers and internal team to define and pursue product/customer opportunities (Retail Wi-Fi, Mesh Repeater, VoiP over Wi-Fi Repeater, Cellular Repeaters, Wi-Max Repeaters, In-Building Distribution Systems)
  - Customer Development from initial contact, joint testing, first purchase order, to new product introduction
  - Contributed to and managed WiDeFi's IP portfolio
  - Pursued fund raising from corporate and venture capital communities

WiDeFi, Inc., President, CEO, and Co-Founder, Director **July 2002 - August 2005**

- Led WiDeFi from inception to the recruitment of an expansion-stage CEO.
- Principal duties:
  - Direct Fundraising of initial seed and Series A Venture Capital
  - General Management (Finance, Business Administration, Legal/Contracts and Organizational Development/Recruiting)
  - Coordination of Board of Directors and Investors
  - Sales (WiDeFi was Cash Flow positive prior to venture investment)

Tantivy Communications **April 1998 - June 2002**
Director of Strategic and Technical Marketing

- Business Development/Technical Due Diligence
- Represented Tantivy in a wide range of Wireless Broad Band Industry Conferences
- Intellectual Property Management and Strategy
  - Represented Tantivy's Patents and their value to External Companies
  - Performed Validity, Infringement, and Value Analysis of Tantivy Patents for non-Tantivy products
- Industry Standards Representation for 3G Technologies
  - TIA/3GPP2, Over 15 Technical Contributions/Papers
  - T1P1 (3GPP Member)
- Project Management of an International Technology Transfer Team (S Korea)
- Performed System Architecture and Analysis

Spectrian, **Advanced Development and Technical Marketing** **1995 - April 1998**

- Interfaced with NORTEL/Qualcomm's Product Management
- Performed Advanced Technology Development/Systems Analysis

Harris Corp. GCSD, **September 1992 - 1995**
Senior Engineer Signal Processing Section, Modems Group

Georgia Tech Research Institute, CSITL **June 1991 - August 1992**

Harris Corp.. ISD, Electro-optics, Co-op **May 1990 - August 1990**
- Acousto-optic signal processing

Standards Development

- Participated in architecting "Internet CDMA" (I-CDMA)
- Jointly led establishment of the Committee T1, working group T1P1.4 "WWINA" standardization effort, which stands for "Wireless Wideband Internet Access"
  - T1 Approved this system as the T1.723-2002 standard
- ATIS approved as **ATIS0700723-2002 I-CDMA Spread Spectrum Systems Air Interface Standard**
- Participated in 3GPP2 Standards Developments (including 15+ technical contributions)

Intellectual Property

- More than 320 Issued U.S. Patents
- More than 700 Issued or Pending International Patent Applications (WIPO)
- Patents Cited at the USPTO more than 6000 times
- 55+ Patents Assigned to Intel
- 45+ Patents Assigned to Qualcomm
- 16+ Patents designated as "Standards Essential" for UMTS (WCDMA)
- 6+ Patents designated as "Standards Essential" for LTE

Testifying Expert Experience

SPH Am., LLC v. Acer, Inc., 09CV02535-CAB MDD, 2012 WL 1344515 (S.D. Cal. Apr. 18, 2012).
Testifying Expert offering opinions on validity for the defense. The technology related to WCDMA modulation techniques. Resulted in settlement prior to trial.

WI-LAN USA, INC. and WI-LAN INC. v. ELEFONAKTIEBOLAGET LM ERICSSON and ERICSSON INC., Case No. l:12-23569-Civ (S.D. FL)
Testifying expert offering opinions on infringement for the defense. The technology involved LTE "contention free" handover (CFRA), and Media Access Control (MAC) layer messaging for Quality of Service (QOS). Resulted in a summary judgement finding of non-infringement for the defense, and settlement after appeal.

U.S. ETHERNET INNOVATIONS, LLC. V. STMICROELECTRONICS, INC.,
Civil Action No. 6:12-cv-4181-MHS-JDL
Testifying expert offering opinions on both validity and infringement for the defense. The technology related to Ethernet devices. Resulted in settlement prior to trial.

UNWIRED PLANET. V. SQUARE, INC.,
Case No. 3:13-CV-00579-RCJ-WGC, DISTRICT OF NEVADA,
Case CBM2014-00156, Case IPR2014-01164, Case IPR2014-01165, UNITED STATES PATENT TRIAL AND APPEAL BOARD,

Provided testimony related to claim construction, and validity for the defense. The technology was related to location based services (LBS). The case resulted in a finding by the Patent Trial and Appeal Board of unpatentability of all asserted claims.

PRISM TECHNOLOGIES LLC. V. T-MOBILE USA, INC., Case No. 12-CV-124

Testifying expert at trial, and deposition offering opinions on both validity and infringement for the defense. The technology was related to SIM/USIM/ISIM based authentication in UMTS, LTE, and IMS networks. The case resulted in a jury verdict of non-infringement.

FASTVDO LLC. V. AT&T Mobility LLC, AT&T Services, Inc., and Apple Inc.,
Case No. 3:16-cv-00385-H-WVG

Engaged by Apple as the testifying expert offering opinions on infringement for the defense. The technology was related to Forward Error Correction (FEC) and voice codecs in GSM and WCDMA standards, including detailed FEC performance simulations. The case was concluded based upon an IPR outcome finding unpatentable subject matter by the PTAB.

BLACKBERRY LIMITED V. BLU PRODUCTS, INC.,
Case No.: 16-23535-CIV-MORENO

Engaged by Blackberry as the testifying expert offering opinions on infringement for the plaintiff. The technology involved WCDMA and battery saving techniques in Radio Resource Control (RRC) states. The case was settled between the parties prior to trial.

CELLULAR COMMUNICATIONS EQUIPMENT LLC V. AT&T Inc., and Apple Inc.
Case No.: 2:15-cv-00576-RWS-RSP

Engaged engaged by Apple as the testifying expert offering opinions on validity and benefits of the alleged inventions for the defense. The technology involved Media Access Control (MAC) messaging for LTE (Power Headroom Reporting) and LTE Advanced (CSI reporting for Carrier Aggregation). The case resulted in summary judgement for the defense.

GENERAL ACCESS SOLUTIONS, LTD. v. Sprint Corporation et al.
Civil Action No. 2:16-cv- 00465 (E.D. Tex.) and PTAB Proceedings (IPR2017-01885 (Patent 7,173,916 B2) IPR2017-01887 (Patent 6,891,810 B2) IPR2017-01889 (Patent 7,230,931 B2),

Engaged by Sprint to provide expert testimony relating to claim construction, and validity for the defense before the Patent Trial and Appeal Board (PTAB) relating to an Inter Partes Review petition, providing multiple expert declarations, and deposition testimony. The technology related to Adaptive Modulation and Coding (AMC) in a wireless system; Adaptive Beamforming, Sectorization, and Multi-Input Multi-Output (MIMO). All trials were instituted by the PTAB Board, with a finding of all petitioned claims unpatentable for two of the three patents.

TC TECHNOLOGY LLC. V., Sprint Corporation and Sprint Spectrum, L.P
Case 1:16-cv-00153-RGA

Engaged by Sprint to provide expert testimony relating to validity and infringement by the defense, in the district of Delaware. The technology related to OFDMA and SC-FDMA use in the LTE uplink, for multiplexing transmissions from different UEs utilizing mutually exclusive OFDM subcarriers. The matter was resolved.

Mobility Workx, LLC v T-Mobile US, Inc.
Civil Action No. 4:17-cv-00567-ALM
Retained by the defendant, and provided declarations and deposition for claim construction, engaged for both invalidity and non-infringement analysis and testimony. This matter relates to LTE handover, and Mobile IP. The case was settled between the parties prior to trial.

Mobility Workx, LLC v Cellco Partnership d/b/a Verizon Wireless
Case No. 4:17-cv-872-ALM
Retained by the defendant, engaged for both invalidity and non-infringement analysis and testimony. This matter relates to LTE handover, and Mobile IP. The case further related to 3GPP compliance testing techniques. This matter was resolved during trial preparation.

Uniloc USA, Inc., et al. v. Apple Inc.
No. 18-cv-158 and 18-cv-161, engaged by Apple as a technical and testifying expert. This matter relates to Quality of Service aspect of 3G UMTS (WCDMA), and the request and allocation of uplink resources in LTE. The matter was stayed, pending result of PTAB IPR Trial.

Wi-LAN v. LG,
Case No. Case No.: 3:18-cv-01577-H-BGS
Engaged by LG as a technical and testifying expert. The technology involved LTE "contention free" handover (CFRA), Media Access Control (MAC) layer messaging for bandwidth management and Quality of Service (QOS). This matter was resolved.

Fractus, S.A. v. Sprint Communications Company, L.P. et al.,
Civil Action No. 2:18-cv-00135 (E.D. Tex.), Engaged by Sprint and Verizon Wireless as a technical and testifying expert for invalidity. The technology involved design aspects of antenna element placement in multiband antenna arrays for use at cellular base stations. This matter was resolved.

Wilson Electronics, LLC v.Cellphone-Mate,Inc. dba SureCall,
Case No. 2:17-cv- 00305-DB (District of Utah)
Retained by the Wilson Electronics, and engaged for both invalidity and non-infringement analysis and testimony in both district court and in ITU proceedings. This matter relates to cellular multi-band wireless signal boosters / repeaters. This matter was resolved.

Sol IP, LLC v Joint Defense Group (AT&T, Ericsson, Nokia, Sprint, Verizon)
Civil Action No. 2:18-cv-00526 (E.D. Tex.)
Retained by each of the defendants, and engaged to provide testimony relating to infringement of the asserted claims for 8 of the asserted patents. The subject matter related to random access, paging, resource allocation, and carrier aggregation in LTE. The matter was resolved.

Polaris PowerLED Technologies, LLC v. TCL Corporation, et al., C.D. California Civil Action No.: 8:20-cv-00127-JVS-DFMBGL Ref. No.: 16725-7 and 16725-8
Engaged by TCL and Hisense to provide expert testimony in district court and to provide a declaration as an expert in an Inter Party Review (IPR) proceeding before the U.S Patent Trial and Appeals Board. The subject matter related to power supply circuitry for use in backlight displays and U.S. Pat. No 11,011,752. The IPR was instituted, and the proceedings were terminated following settlement.

SmartSky Networks v. Wireless Systems Solutions, LLC; DAG Wireless Solutions, et al., M.D. North Carolina (Case No. 1:20-cv-00834-NCT-LPA), and related arbitration proceedings
Engaged by SmartSky to provide expert testimony related to a trade secret dispute in district court, and an arbitration proceeding. The technology related to air to ground internet service for aircraft using a proprietary LTE derived system including airborne radios and ground stations allowing for increased range and velocity beyond that which can be provided by standards based LTE systems. The system includes advanced UE and eNodeB architectures, and modified LTE protocols. I provided expert reports and declarations in both district court and arbitration. I further provided live testimony before an arbitration panel. The arbitration panel found in favor of SmartSky, achieving a successful injunction against WSS/DAG.

Dali Wireless v. JMA Wireless, Civil Action 1:99-mc-09999
Engaged by JMA Wireless to provide several declarations as an expert in an Inter Party Review (IPR) proceeding before the U.S Patent Trial and Appeals Board, and further testimony relating to the district course cases. The subject matter related to in-building wireless signal distribution systems utilizing digital network (CPRI / IP packetized) interfaces and as well as LTE eNodeB architectures. This matter was resolved pending expert discovery.

Dali Wireless v. Corning Optical Communications LLC, No. 3:20-cv-06469 (N.D. Cal.) and Dali Wireless, Inc. v. Corning Incorporated et al., No. 6:20-cv-00827 (W.D. Tex.)
Engaged by Corning to provide several declarations as an expert in an Inter Party Review (IPR) proceeding before the U.S Patent Trial and Appeals Board and further testimony relating to the district course cases. The subject matter related to distributed antenna systems for in-building wireless signal distribution as well as intercell frequency reuse and interference management techniques. This matter was resolved pending expert discovery.

Flexiworld Technologies, Inc. v. Amazon.com, Inc., et al., Case No. 6:20-cv-00553-ADA (W.D. Texas), and Case No. 2:21-cv-01055-DGE (W.D. Washington, Tacoma)
Engaged by Amazon to provide testimony for district court matter in the Western District of Texas. The matter related to approaches for mobile devices to utilize Bluetooth to interface with smart speakers and servers, allowing for the request of content to be played by an output device (speaker) based upon specific requests, including in some cases voice requests. This matter was transferred to Western District of Washington, Tacoma Division and remains pending.

WSOU Investments, LLC d/b/a Brazos Licensing and Development v. Huawei Technologies Co., Ltd. et al., 6:20-cv-00544 (W.D. Tex.)
Engaged by Huawei to provide expert testimony in district court. The matter related to LTE protocols and signaling, Hybrid ARQ, and scheduling of retransmissions relative to new transmissions from a UE to an eNodeB. I provided a claim construction declaration, prior to the matter being resolved.

Ericsson, Inc. IPR petition of 7,532,865, (TOT Power Control, S.L, Patent Owner)
Engaged by Ericsson, Inc. to provide a declaration as an expert in an Inter Party Review (IPR) proceeding before the U.S Patent Trial and Appeals Board, relating to US. Pat. No. 7,532,865. The matter involved “outer loop” power control techniques in WCDMA systems or other mobile devices.

Sierra Wireless et al, IPR petition of 7,215,653 (Sisvel, Patent Owner).
Engaged by Sierra Wireless to provide a declaration as an expert in an Inter Party Review (IPR) proceeding before the U.S. Patent Trial and Appeals Board, relating to US. Pat. No. 7,215,653. This matter involved the control of uplink data rates and power control in a CDMA system called 1xEV-DO developed within the 3GPP2 standards, in which I personally participated. The IPR was instituted by the PTAB, and all claims were found unpatentable.

KAIFI LLC v. T-Mobile US, Inc. et al., Case No. 2:20-cv-281-JRG (E.D. Tex.)
Engaged by T-Mobile to provide expert testimony for both (in)validity and (non)infringement for a district court matter in the Eastern District of Texas. The matter involved a mobile device’s roaming between an outdoor cellular / LTE networks and an indoor Wi-Fi network. It further included approaches for the LTE core network to perform the selection of transmission paths of VoLTE and VoWiFi signals involving the LTE core (EPC), including the ePDG, and IMS networks. This matter settled.

KAIFI LLC v. Verizon Wireless. et al., Civil Action No. 2:20-cv-00280-JRG (E.D. Tex.)
Engaged by Verizon to provide expert testimony relating to (in)validity for a district court matter in the Eastern District of Texas. The matter involved a mobile device's roaming between an outdoor cellular / LTE networks and an indoor Wi-Fi network. It further included approaches for the LTE core network to perform the selection of transmission paths of VoLTE and VoWiFi signals involving the LTE core (EPC), including the ePDG, and IMS networks. This matter settled.

NEO Wireless, LLC v. DELL Technologies Inc. and DELL Inc., Case No. 6:21-cv-024-ADA (W.D. Tex.)
Engaged by Dell to provide expert testimony relating to claim construction, (in)validity and (non)infringement in the Western District of Texas, Waco Division. The matter involved LTE and 5G devices and standards aspects including signaling aspect associated with: OFDM/OFDMA, resource scheduling and frame structures, random access and ranging, transmit diversity and beamforming signaling. This matter was settled by the parties.

American Patents v. Xerox., Case No. 6:21- cv-636-ADA, (W.D. Tex.)
Engaged by Xerox to provide expert testimony relating to claim construction, (in)validity and (non)infringement in the Western District of Texas, Waco Division. The matter involved IEEE802.11 (WiFi) based systems relating to a number of patents, including Time and frequency synchronization in multi-input, multi-output (MIMO) systems, the assessment and management of interference in 802.11 systems. This matter was resolved.

TurboCode, v. Dell Technologies Inc. and Dell Inc., Case No. Civil Action No. 6:21-cv-359 (W.D. of Tex.)
Engaged by Dell to provide expert testimony relating to claim construction, (in)validity and (non)infringement in the Western District of Texas, Waco Division. The matter involved 3G / WCDMA use and implementations of Turbo Coding in wireless transmission and reception. This matter was settled by the parties.

XR Communications d/b/a Vivato Technologies v. Microsoft Corporation, Case No: 6:21-cv-695 (WDTX)
Engaged by Microsoft to provide expert testimony relating to claim construction, (in)validity and (non)infringement in the Western District of Texas. The matter involved the use of transmit beamforming, channel estimation and diversity techniques in IEEE802.11n, 802.11AC, and 802.11AX systems (WiFi). This matter was settled by the parties.

Finesse Wireless, LLC v. AT&T Mobility LLC; Cellco Partnership d/b/a Verizon Wireless; Nokia of America Corporation; Ericsson Inc., Case No. 2:21-CV-00063-JRG (E.D. TX).
Engaged by Nokia to provide expert testimony relating to claim construction, (in)validity and (non)infringement in the Eastern District of Texas. The matter involved aspects of LTE and 5G infrastructure relating to the cancelation of radio frequency intermodulation distortion produced in a transmitter from the receiver of the same base station, and involving both passive intermodulation (PIM) and active intermodulation from Power amplifiers (PA). This matter remains pending.

GODO KAISHA IP BRIDGE v Ericsson and Nokia Case No. 2:21-CV-213-JRG, Case No. 2:21-CV-215-JRG (E.D. TX).
Engaged by Nokia and Ericsson to provide expert testimony relating to claim construction, (in)validity and (non)infringement in the Eastern District of Texas. The matter involved aspects of LTE and 5G infrastructure relating to the channel state information (CSI/CQI) configuration and triggering for periodic and aperiodic, wideband and sub-band reports from LTE/NR UEs. This matter was settled prior to trail.

Microsoft Corporation, IPR petition of '414, '763, '988, '890 (Lemco Corporation, Patent Owner).
Engaged by Microsoft Corporation to provide several declarations as an expert in Inter Party Review (IPR) proceedings before the U.S. Patent Trial and Appeals Board, relating to US. Pat. Nos. 7,653,414, 7,548,763, 7,855,988, and 9,191,980. These matters involved distributed cellular network infrastructure architectures. The patents relate to software implementations of cellular network infrastructure, including a distributed mobile architecture server and a distributed mobile architecture gateway. This matter remains pending.

Ozmo v. Dell, Case No: 6:22-cv-00642-ADA (WDTX)
Engaged by Dell to testimony related to claim construction, (in)validity and (non)infringement relating to U.S Pat. Nos. 8,599,814; 9,264,991; 10,873,906; 11,012,934; 11,122,504; and 11,252,659 and share common provisional applications. The subject matter of the patents relate to seamlessly integrating short-range wireless personal area networks ("WPANs") into longer-range wireless local area networks. ("WLANs").

XR Communications d/b/a Vivato Technologies v. ASUSTek Computer Inc., Computer Inc.
Case No: 6:21-cv-00622-ADA (WDTX)
Engaged by ASUSTek to provide expert testimony relating to claim construction, (in)validity and (non)infringement in the Western District of Texas. The matter involved the use of transmit beamforming, channel estimation and diversity techniques in IEEE802.11n, 802.11AC, and 802.11AX systems (WiFi). This matter remains pending.

List of Issued U.S. Patents

United States Pat. No.	Title
5,550,549	Transponder system and method
5,687,196	Range and bearing tracking system with multipath rejection
5,898,338	Adaptive digital predistortion linearization and feed-forward correction of RF power amplifier
5,929,704	Control of RF error extraction using auto-calibrating RF correlator
5,949,283	Adaptive digital predistortion linearization and feed-forward correction of RF power amplifier
5,960,047	System and method for transmitting information signals
6,078,216	Aliased wide band performance monitor for adjusting predistortion and vector modulator control parameters of RF amplifier
6,100,843	Adaptive antenna for use in same frequency networks
6,212,220	Method and apparatus for creating non-interfering signals using non-orthogonal techniques
6,222,832	Fast Acquisition of traffic channels for a highly variable data rate reverse link of a CDMA wireless communication system
6,239,756	Antenna array with housing
6,301,291	Pilot symbol assisted modulation and demodulation in wireless communication systems
6,304,215	Method of use for an adaptive antenna in same frequency networks
6,362,790	Antenna array structure stacked over printed wiring board with beamforming components
6,388,999	Dynamic bandwidth allocation for multiple access communications using buffer urgency factor
6,396,456	Stacked dipole antenna for use in wireless communications systems
6,400,317	Method and apparatus for antenna control in a communications network
6,404,386	Adaptive antenna for use in same frequency networks
6,421,336	Variable rate orthogonally coded reverse link structure
6,448,938	Method and apparatus for frequency selective beam forming
6,452,913	Fast acquisition of traffic channels for a highly variable data rate reverse link of a CDMA wireless communication system
6,456,835	Arbitration method for high power transmissions in a code division multiple access system
6,473,036	Method and apparatus for adapting antenna array to reduce adaptation time while increasing array performance
6,515,635	Adaptive antenna for use in wireless communication systems
6,518,920	Adaptive antenna for use in same frequency networks
6,542,481	Dynamic bandwidth allocation for multiple access communication using session queues
6,545,990	Method and apparatus for a spectrally compliant cellular communication system
6,545,994	Access probe acknowledgment including collision detection to avoid oversetting initial power level
6,563,809	Subscriber-controlled registration technique in a CDMA system
6,600,456	Adaptive antenna for use in wireless communication systems
6,614,776	Forward error correction scheme for high rate data exchange in a wireless system
6,678,260	System and method for maintaining wireless channels over a reverse link of a CDMA wireless communication system
6,707,804	Fast acquisition of traffic channels for a highly variable data rate reverse link of a CDMA wireless communication system
6,785,323	Variable rate coding for forward link
6,788,268	Method and apparatus for frequency selective beam forming
6,792,290	Method and apparatus for performing directional re-scan of an adaptive antenna
6,801,564	Reverse link correlation filter in wireless communication systems
6,804,223	Reverse link pilot integrated with block codes
6,873,293	Adaptive receive and omnidirectional transmit antenna array
6,888,504	Aperiodic array antenna
6,888,807	Applying session services based on packet flows
6,894,653	Low cost multiple pattern antenna for use with multiple receiver systems
6,904,079	Access channel structure for wireless communication system
6,911,879	Electronic phase shifter with enhanced phase shift performance
6,917,581	Use of orthogonal or near orthogonal codes in reverse link

6,917,642	Method for using a non-orthogonal pilot signal with data channel interference cancellation
6,925,070	Time-slotted data packets with a preamble
6,928,064	Fast acquisition of traffic channels for a highly variable data rate reverse link of a CDMA wireless communication system
6,933,887	Method and apparatus for adapting antenna array using received predetermined signal
6,937,562	Application specific traffic optimization in a wireless link
6,940,842	System and method for maintaining wireless channels over a reverse link of a CDMA wireless communication system
6,941,152	Wireless subscriber network registration system for configurable services
6,954,448	Alternate channel for carrying selected message types
6,956,840	Power control protocol for highly variable data rate reverse link of a wireless communication system
6,973,140	Maximizing data rate by adjusting codes and code rates in CDMA system
6,989,797	Adaptive antenna for use in wireless communication systems
6,992,546	Electronic phase shifter with enhanced phase shift performance
7,002,902	Method and system for economical beam forming in a radio communication system
7,006,428	Method for allowing multi-user orthogonal and non-orthogonal interoperability of code channels
7,006,483	Qualifying available reverse link coding rates from access channel power setting
7,009,559	Method and apparatus for adapting antenna array using received predetermined signal
7,015,773	Electronic phase shifter with enhanced phase shift performance
7,034,759	Adaptive receive and omnidirectional transmit antenna array
7,072,316	Subscriber-controlled registration technique in a CDMA system
7,079,523	Maintenance link using active/standby request channels
7,092,430	Method for using a non-orthogonal pilot signal with data channel interference cancellation
7,113,786	Antenna adaptation to manage the active set to manipulate soft hand-off regions
7,145,964	Maximizing data rate by adjusting codes and code rates in CDMA system
7,176,844	Aperiodic array antenna
7,184,417	Power control protocol for highly variable data rate reverse link of a wireless communication system
7,187,904	Frequency translating repeater with low cost high performance local oscillator architecture
7,200,134	Wireless area network using frequency translation and retransmission based on modified protocol messages for enhancing network coverage
7,215,297	Adaptive antenna for use in wireless communication systems
7,218,623	Coded reverse link messages for closed-loop power control of forward link control messages
7,221,664	Transmittal of heartbeat signal at a lower level than heartbeat request
7,224,685	Method of detection of signals using an adaptive antenna in a peer-to-peer network
7,227,907	Antenna adaptation comparison method for high mobility
7,230,935	Physical layer repeater with selective use of higher layer functions based on network operating conditions
7,233,627	Method for searching pilot signals to synchronize a CDMA receiver with an associated transmitter
7,233,771	Non-frequency translating repeater with downlink detection for uplink and downlink synchronization
7,253,783	Low cost multiple pattern antenna for use with multiple receiver systems
7,272,169	Reverse link correlation filter in wireless communication systems
7,289,827	Method and apparatus for performing directional re-scan of an adaptive antenna
7,308,285	Antenna adaptation in a time division duplexing system
7,366,154	Forward error correction scheme for high rate data exchange in a wireless system
7,394,791	Multi-detection of heartbeat to reduce error probability
7,425,928	Method and apparatus for frequency selective beam forming
7,426,241	Variable rate coding for forward link
7,428,263	Method for using a non-orthogonal pilot signal with data channel interference cancellation
7,433,340	Staggering forward and reverse wireless channel allocation timing
7,447,187	Reverse link pilot integrated with block codes
7,463,200	Directional antenna configuration for TDD repeater

7,463,201	Aperiodic array antenna
7,480,280	Fast acquisition of traffic channels for a highly variable data rate reverse link of a CDMA wireless communication system
7,483,473	Access channel structure for wireless communication system
7,496,072	System and method for controlling signal strength over a reverse link of a CDMA wireless communication system
7,502,351	Alternate channel for carrying selected message types
7,502,424	Maximizing data rate by adjusting codes and code rates
7,528,789	Adaptive antenna for use in wireless communication systems
7,529,264	Use of orthogonal or near orthogonal codes in reverse link
7,551,663	Use of correlation combination to achieve channel detection
7,580,674	Intelligent interface for controlling an adaptive antenna array
7,586,880	Method of detection of signals using an adaptive antenna in a peer-to-peer network
7,592,969	Multiple-antenna device having an isolation element
7,593,380	Variable rate forward error correction for enabling high performance communication
7,602,749	Fast acquisition of traffic channels for a highly variable data rate reverse link of a CDMA wireless communication system
7,613,227	Reverse link correlation filter in wireless communication systems
7,701,903	Power control protocol for highly variable data rate reverse link of a wireless communication system
7,733,285	Integrated, closely spaced, high isolation, printed dipoles
7,746,830	System and method for maintaining wireless channels over a reverse link of a CDMA wireless communication system
7,773,566	System and method for maintaining timing of synchronization messages over a reverse link of a CDMA wireless communication system
7,787,408	Wireless repeater with master/slave configuration
7,826,437	Variable rate coding for enabling high performance communication
7,889,702	Time-slotted data packets with a preamble
7,893,889	Multiple-antenna device having an isolation element
7,907,513	Superimposed composite channel filter
7,907,891	Physical layer repeater utilizing real time measurement metrics and adaptive antenna array to promote signal integrity and amplification
7,911,985	Automatic gain control and filtering techniques for use in on-channel repeater
7,911,993	Method and apparatus for allowing soft handoff of a CDMA reverse link utilizing an orthogonal channel structure
7,916,772	Method for searching pilot signals to synchronize a CDMA receiver with an associated transmitter
7,936,728	System and method for maintaining timing of synchronization messages over a reverse link of a CDMA wireless communication system
7,936,736	Enforcing policies in wireless communication using exchanged identities
7,944,845	Application specific traffic optimization in a wireless link
7,990,904	Wireless network repeater
8,023,885	Non-frequency translating repeater with downlink detection for uplink and downlink synchronization
8,027,642	Transmission canceller for wireless local area network
8,045,536	Forward error correction scheme for high rate data exchange in a wireless system
8,059,727	Physical layer repeater configuration for increasing MIMO performance
8,060,009	Wireless local area network repeater with automatic gain control for extending network coverage
8,068,474	Variable rate coding for enabling high performance communication
8,072,944	Staggering forward and reverse wireless channel allocation timing
8,072,958	Reverse link pilot integrated with block codes
8,078,100	Physical layer repeater with discrete time filter for all-digital detection and delay generation
8,089,913	Physical layer repeater with selective use of higher layer functions based on network operating conditions
8,090,359	Exchanging identifiers between wireless communication to determine further information to be exchanged or further services to be provided
8,090,616	Visual identification information used as confirmation in a wireless communication
8,095,067	Frequency translating repeater with low cost high performance local oscillator architecture
8,111,645	Wireless local area network repeater with detection

8,116,239	Use of a filterbank in an adaptive on-channel repeater utilizing adaptive antenna arrays
8,116,749	Protocol for anonymous wireless communication
8,121,535	Configuration of a repeater
8,122,134	Reducing loop effects in a wireless local area network repeater
8,134,980	Transmittal of heartbeat signal at a lower level than heartbeat request
8,139,546	System and method for maintaining wireless channels over a reverse link of a CDMA wireless communication system
8,155,096	Antenna control system and method
8,175,120	Minimal maintenance link to support synchronization
8,194,783	Variable rate coding for a forward and reverse link
8,204,140	Subscriber unit and method for variable forward error correction (FEC) decoding
8,238,912	Non-intrusive detection of enhanced capabilities at existing cellsites in a wireless data communication system
8,259,687	Dynamic bandwidth allocation for multiple access communications using buffer urgency factor
8,259,744	Use of orthogonal or near orthogonal codes in reverse link
8,265,630	Antenna adaptation to manage the active set to manipulate soft hand-off regions
8,274,954	Alternate channel for carrying selected message types
8,285,201	Wideband echo cancellation in a repeater
8,315,294	Method for searching pilot signals to synchronize a CDMA receiver with an associated transmitter
8,321,542	Wireless channel allocation in a base station processor
8,358,969	Feedback delay control in an echo cancellation repeater
8,363,590	Physical layer repeater with roaming support based on multiple identifiers
8,369,277	Signaling for wireless communications
8,369,842	Exchanging identifiers between wireless communication to determine further information to be exchanged or further services to be provided
8,370,955	Enforcing policies in wireless communication using exchanged identities
8,374,592	Exchanging identifiers between wireless communication to determine further information to be exchanged or further services to be provided
8,385,305	Hybrid band intelligent backhaul radio
8,385,818	Delay control to improve frequency domain channel estimation in an echo cancellation repeater
8,385,896	Exchanging identifiers between wireless communication to determine further information to be exchanged or further services to be provided
8,385,913	Using a first wireless link to exchange identification information used to communicate over a second wireless link
8,422,540	Intelligent backhaul radio with zero division duplexing
8,437,329	Variable rate coding for enabling high performance communication
8,437,330	Antenna control system and method
8,463,255	Method and apparatus for a spectrally compliant cellular communication system
8,467,353	Time-slotted data packets with a preamble
8,467,363	Intelligent backhaul radio and antenna system
8,477,665	Method in a wireless repeater employing an antenna array for interference reduction
8,498,234	Wireless local area network repeater
8,502,733	Transmit co-channel spectrum sharing
8,503,926	IQ imbalance compensation in interference cancellation repeater using a zero-IF radio architecture
8,509,268	Minimal maintenance link to support sychronization
8,509,835	Reverse link initial power setting using effective radiated power message to compute path loss
8,521,862	Wireless channel allocation in a base station processor
8,526,401	Power control protocol for highly variable data rate reverse link of wireless communication system
8,537,656	Method for compensating for multi-path of a CDMA reverse link utilizing an orthogonal channel structure
8,542,623	Use of RF reference in a digital baseband interference cancellation repeater
8,553,610	Interference cancellation repeater incorporating a non-linear element
8,559,379	Method and apparatus for mitigating oscillation between repeaters
8,576,805	Subscriber-controlled registration technique in a CDMA system

8,582,552	Maintaining a maintenance channel in a reverse link of a wireless communications system
8,599,906	Closed form calculation of temporal equalizer weights used in a repeater transmitter leakage cancellation system
8,605,702	Maintaining a maintenance channel in a reverse link of a wireless communications system
8,619,837	Use of adaptive antenna array in conjunction with an on-channel repeater to improve signal quality
8,630,211	Hybrid radio architecture for repeaters using RF cancellation reference
8,638,839	Intelligent backhaul radio with co-band zero division duplexing
8,638,877	Methods, apparatuses and systems for selective transmission of traffic data using orthogonal sequences
8,649,418	Enhancement of the channel propagation matrix order and rank for a wireless channel
8,676,131	Method and apparatus for allowing soft handoff of a CDMA reverse link utilizing an orthogonal channel structure
8,687,606	Alternate channel for carrying selected message types
8,709,092	Periprosthetic fracture management enhancements
8,737,343	Coded reverse link messages for closed-loop power control of forward link control messages
8,755,360	Method and apparatus for a spectrally compliant cellular communication system
8,755,473	Method and apparatus for detecting rapid changes in signaling path environment
8,774,079	Repeater techniques for multiple input multiple output utilizing beam formers
8,787,248	Method in a wireless repeater employing an antenna array including vertical and horizontal feeds for interference reduction
8,790,321	Apparatus, system, and method for harvesting improved bone graft material with reamer-irrigator-aspirator (RIA) device
8,792,458	System and method for maintaining wireless channels over a reverse link of a CDMA wireless communication system
8,811,367	Qualifying available reverse link coding rates from access channel power setting
8,824,442	Intelligent backhaul radio with adaptive channel bandwidth control
8,830,977	Reverse link pilot integrated with block codes
8,842,642	Transmitting acknowledgement messages using a staggered uplink time slot
8,849,186	Repeater communication using inserted low power sequences
8,849,698	Exchanging identifiers between wireless communication to determine further information to be exchanged or further services to be provided
8,861,429	Selective carrier amplification in a wireless repeater
8,885,688	Control message management in physical layer repeater
8,897,340	Enhancement of the channel propagation matrix order and rank for a wireless channel
8,908,654	Dynamic bandwidth allocation for multiple access communications using buffer urgency factor
8,937,874	Adjusting repeater gains based upon received downlink power level
8,942,216	Hybrid band intelligent backhaul radio
8,948,235	Intelligent backhaul radio with co-band zero division duplexing utilizing transmitter to receiver antenna isolation adaptation
8,958,457	Channel structure for a wireless communication system
8,964,909	Maximizing data rate by adjusting codes and code rates
8,989,762	Advanced backhaul services
9,014,118	Signaling for wireless communications
9,019,930	Coded reverse link messages for closed-loop power control of forward link control messages
9,020,009	Inserted pilot construction for an echo cancellation repeater
9,020,621	Network based media enhancement function based on an identifier
9,038,129	Enforcing policies in wireless communication using exchanged identities
9,042,400	Multi-detection of heartbeat to reduce error probability
9,135,612	Proximity detection, virtual detection, or location based triggering of the exchange of value and information
9,161,164	Exchanging identifiers between wireless communication to determine further information to be exchanged or further services to be provided
9,179,240	Transmit co-channel spectrum sharing
9,185,604	Qualifying available reverse link coding rates from access channel power setting
9,210,616	Application specific traffic optimization in a wireless link
9,225,395	Antenna control system and method
9,226,295	Hybrid band radio with data direction determined by a link performance metric

9,237,209	Time-slotted data packets with a preamble
9,247,510	Use of correlation combination to achieve channel detection
9,252,857	Embedded control signaling for wireless systems
9,294,222	Variable rate coding for forward and reverse link
9,301,274	Minimal maintenance link to support synchronization
9,306,658	Method and apparatus for a spectrally compliant cellular communication system
9,306,703	Variable rate coding for enabling high performance communication
9,307,532	Signaling for wireless communications
9,325,398	Method for installing a backhaul radio with an antenna array
9,325,477	Alternate channel for carrying selected message types
9,345,523	Periprosthetic fracture management enhancements
9,363,759	Power control protocol for highly variable data rate reverse link of a wireless communication system
9,369,235	Maximizing data rate by adjusting codes and code rates
9,374,822	Method for installing a hybrid band radio
9,397,808	Reverse link pilot integrated with block codes
9,398,120	Time-slotted data packets with a preamble
9,456,376	Subscriber-controlled registration technique in a CDMA system
9,456,428	Method and apparatus for allowing soft handoff of a CDMA reverse link utilizing an orthogonal channel structure
9,460,433	Proximity detection, virtual detection, or location based triggering of the exchange of value and information
9,490,918	Zero division duplexing MIMO backhaul radio with adaptable RF and/or baseband cancellation
9,496,915	Use of orthogonal or near orthogonal codes in reverse link
9,497,761	Qualifying available reverse link coding rates from access channel power setting
9,522,066	Periprosthetic fracture management enhancements
9,525,923	Multi-detection of heartbeat to reduce error probability
9,554,061	Smart hub
9,555,169	Apparatus for harvesting improved bone graft material utilizing an implantable biodegradable filter
9,572,163	Hybrid band radio with adaptive antenna arrays
9,577,733	Method for installing a backhaul link with multiple antenna patterns
9,655,062	System and method for coordination of wireless maintenance channel power control
9,661,583	Reverse link initial power setting using effective radiated power message to compute path loss
9,686,713	Application specific traffic optimization in a wireless link
9,686,790	Signaling for wireless communications
9,713,019	Self organizing backhaul radio
9,713,157	Method for installing a backhaul link with alignment signals
9,775,115	Antenna control system and method
9,780,930	Communicating reference and data information in a wireless network
9,781,626	Wireless channel allocation in a base station processor
9,807,714	Minimal maintenance link to support synchronization
9,832,664	Receiving and transmitting reverse link signals from subscriber units
9,867,101	Method and apparatus for allowing soft handoff of a CDMA reverse link utilizing an orthogonal channel structure
9,872,196	Subscriber-controlled registration technique in a CDMA system
9,876,530	Advanced backhaul services
9,913,271	Qualifying available reverse link coding rates from access channel power setting
9,913,722	Periprosthetic fracture management enhancements
9,924,468	Antenna control system and method
9,936,500	Transmitting acknowledgement messages using a staggered uplink time slot
9,954,635	Variable rate coding for enabling high performance communication
9,974,116	Handoff to base station having enhanced capabilities

10,057,700	Smart hub
10,063,363	Zero division duplexing MIMO radio with adaptable RF and/or baseband cancellation
10,064,144	Use of correlation combination to achieve channel detection
10,129,888	Method for installing a fixed wireless access link with alignment signals
10,153,885	Alternate channel for carrying selected message types
10,204,357	Proximity detection, virtual detection, or location based triggering of the exchange of value and information
10,211,940	Use of orthogonal or near orthogonal codes in reverse link
10,237,760	Self organizing backhaul radio
10,284,253	Advanced backhaul services
10,286,123	Removable biocompatible substrate filter for a reaming and collection device
10,299,218	System and method for coordination of wireless maintenance channel power control
10,306,635	Hybrid band radio with multiple antenna arrays
10,356,782	Embedded control signaling for self-organizing wireless backhaul radio and systems
10,357,370	Periprosthetic fracture management enhancements
10,390,311	Maintaining a maintenance channel in a reverse link of a wireless communications system
10,638,468	Qualifying available reverse link coding rates from access channel power setting
10,687,161	Smart hub
10,687,950	Periprosthetic shoulder fracture repair
10,700,733	Advanced backhaul services
10,708,918	Electronic alignment using signature emissions for backhaul radios
10,735,979	Self organizing backhaul radio
10,736,110	Method for installing a fixed wireless access link with alignment signals
10,762,532	Proximity detection, virtual detection, or location based triggering of the exchange of value and information
10,805,887	Maintaining a maintenance channel in a reverse link of a wireless communications system
10,821,030	Apparatus and method for a temperature released adhesive structure for use with bandages
10,874,520	Combination intra-medullary and extra-medullary fracture stabilization with aligning arm
10,932,267	Hybrid band radio with multiple antenna arrays
10,966,201	Embedded control signaling for self-organizing wireless backhaul radio and systems
11,000,380	Combination intra-medullary and extra medullary fracture stabilization with aligning arm
11,013,605	Combination intra-medullary and extra medullary fracture stabilization with aligning arm
11,074,615	Efficient and secure communication using wireless service identifiers
11,219,527	Combination intra-medullary and extra-medullary fracture stabilization with aligning arm
11,238,499	Proximity detection, virtual detection, or location based triggering of the exchange of value and information
11,260,164	Negative pressure wound therapy dressing and related apparatus
11,303,322	Advanced backhaul services
11,310,614	Smart Hub
11,334,918	Exchanging identifiers between wireless communication to determine further information to be exchanged or further services to be provided
11,343,060	Zero division duplexing MIMO radio with adaptable RF and/or baseband cancellation
11,343,684	Self organizing backhaul radio
11,437,740	Removable biocompatible substrate filter for a reaming and collection device
11,443,344	Efficient and secure communication using wireless service identifiers
11,6333,217	Reduction and fixation apparatus for calcaneal fracture
11,684,518	Apparatus and method for a temperature released adhesive structure for use with bandages
11,687,971	Efficient and secure communication using wireless service identifiers
11,723,776	Periprosthetic shoulder fracture repair
D532780	Wireless repeater housing